

Operators Manual

With Illustrated Parts Lists

TM-286
1st printing



ATARI SYSTEM I™

Atari Games Corporation

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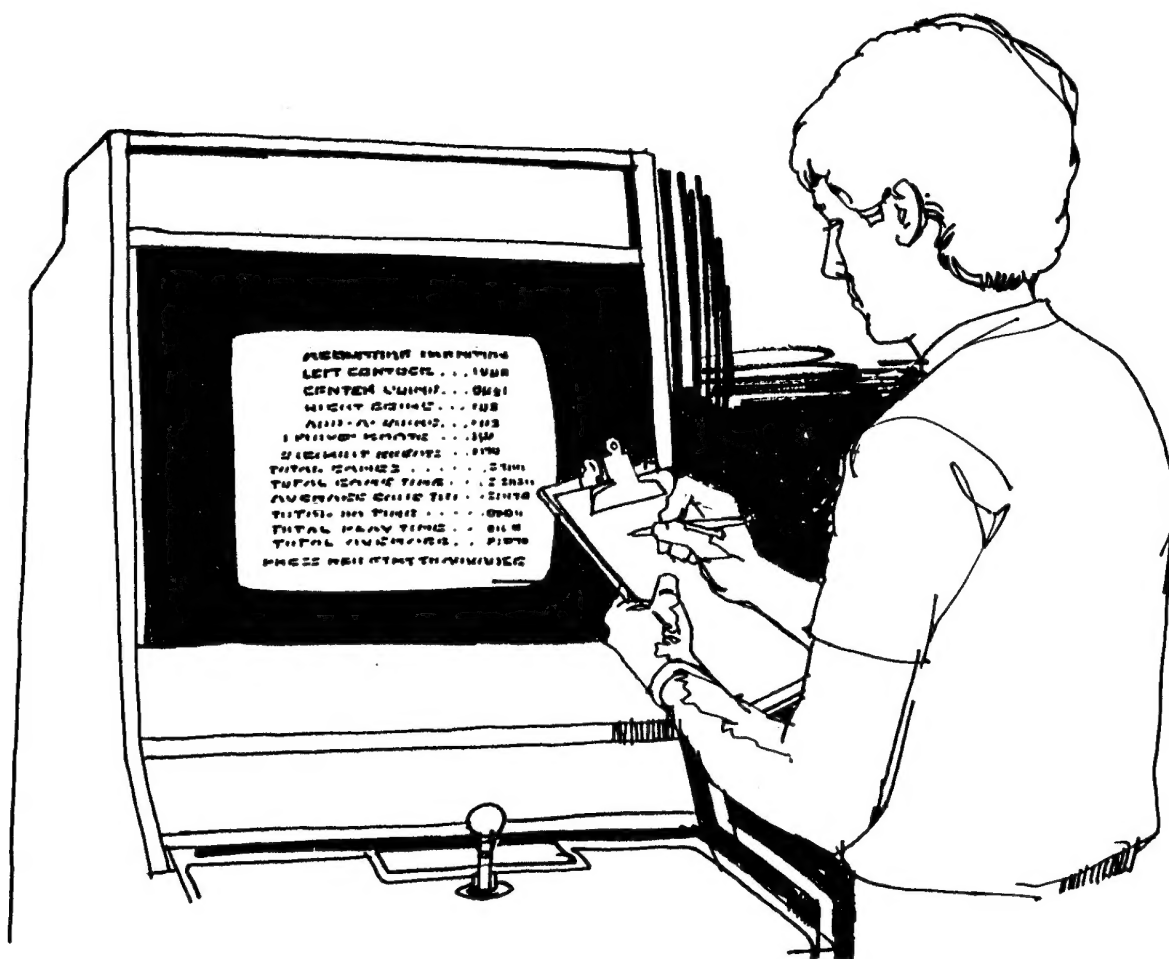
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Operators Manual

With Illustrated Parts Lists



ATARI SYSTEM ITM



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Notice Regarding Non-ATARI® Parts

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Use of non-ATARI parts or modifications of any ATARI game circuitry may adversely affect the safety of your game, and may cause injury to you and your players.

You may void the game warranty (printed on the inside back cover of this manual) if you do any of the following:

- Substitute non-ATARI parts in the game.
- Modify or alter any circuits in the game by using kits or parts *not* supplied by Atari Games Corporation.

NOTE

This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instruction manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of Federal Communications Commission (FCC) Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area or modification to this equipment is likely to cause interference in which case the user, at his own expense, will be required to take whatever measures may be required to correct the interference. If you suspect interference from an ATARI® game at your location, check the following:

- All green ground wires in the game are properly connected as shown in the game wiring diagram.
- The power cord is properly plugged into a grounded three-wire outlet.
- The game printed-circuit boards (PCB) are properly installed with the Electromagnetic Interference (EMI) ground plane.

If you are still unable to solve the interference problem, please contact Customer Service at Atari Games Corporation. See the inside front cover of this manual for service in your area.

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Safety Summary

The following safety precautions apply to all game operators and service personnel. Specific warnings and cautions will be found throughout this manual where they apply.

⚠ WARNING ⚠

Properly Ground the Game. Players may receive an electrical shock if this game is not properly grounded! To avoid electrical shock, do not plug in the game until it has been inspected and properly grounded. This game should only be plugged into a grounded three-wire outlet. If you have only a 2-wire outlet, we recommend you hire a licensed electrician to install a grounded outlet. Players may receive an electrical shock if the control panel is not properly grounded! After servicing any parts on the control panel, check that the grounding wire is firmly secured to the inside of the control panel. Only then should you lock up the game.

AC Power Connection. Before connecting the game to the AC power source, verify that the game's power supply is properly configured for the line voltage in your location.

Disconnect Power During Repairs. To avoid electrical shock, disconnect the game from the AC power source before removing or repairing any part of the game. When removing or repairing the video display, extra precautions must be taken to avoid electrical shock because high voltages may exist within the display circuitry and cathode-ray tube (CRT) even after power has been disconnected. Do not touch internal parts of the display with your hands or with metal objects! Always discharge the high voltage from the CRT before servicing this area of the game. To discharge the CRT: Attach one end of a large, well-insulated, 18-gauge jumper wire to ground. Momentarily touch the free end of the grounded jumper to the CRT anode by sliding it under the anode cap. Wait two minutes and discharge the anode again.

Use Only ATARI Parts. To maintain the safety integrity of your ATARI game, do not use non-ATARI parts when repairing the game. Use of non-ATARI parts or other modifications to the game circuitry may adversely affect the safety of your game, and injure you or your players.

Handle Fluorescent Tube and CRT With Care. If you drop a fluorescent tube or CRT and it breaks, it may implode! Shattered glass can fly six feet or more from the implosion.

Use the Proper Fuses. To avoid electrical shock, use replacement fuses which are specified in the parts list for this game. Replacement fuses must match those replaced in fuse type, voltage rating, and current rating. In addition, the fuse cover must be in place during game operation.

CAUTION

Properly Attach All Connectors. Make sure that the connectors on each printed-circuit board (PCB) are properly plugged in. Note that they are keyed to fit only one way. If they do not slip on easily, do not force them. A reversed connector may damage your game and void the warranty.

Ensure the Proper AC Line Frequency. Video games manufactured for operation on 60 Hz line power (i.e., United States) must not be operated in countries with 50 Hz line power (i.e., Europe). The fluorescent light ballast transformer will overheat, causing a potential fire hazard if 60 Hz games are operated on power lines using 50 Hz. Check the product identification label of your game for the line frequency required.

Set-Up

WARNING

To avoid electrical shock, do not plug in the cabinet until it has been properly inspected and set up for the line voltage in your area.

This cabinet should only be connected to a grounded three-wire outlet. If you only have a two-wire outlet, we recommend you hire a licensed electrician to install a grounded outlet. Players can receive an electrical shock if the cabinet is not properly grounded.

Do not touch internal parts of the display with your hands or with metal objects.

How to Use This Manual

This manual is intended for game operators and service personnel. The information in this manual describes how to set up, maintain, and troubleshoot your Atari Games System I™ cabinet. Please refer to the game kit operators manual for information on the Cartridge Printed-Circuit Board (PCB) and the self-test of the game.

Your System I cabinet is designed to accept the necessary hardware to easily convert the cabinet into a variety of games. Consequently, this manual contains information that applies to those parts of the System I cabinet that are common to *all* games. Information that applies to those parts that are replaced to convert the System I cabinet to a particular game are contained in a game kit operators manual that comes with each game kit. Where applicable, references are provided in this manual to the game kit operators manual.

This manual contains the following information on the System I cabinet:

- Chapter 1 provides set-up information.
- Chapter 2 provides preventive and corrective maintenance procedures.
- Chapter 3 provides troubleshooting procedures.
- Chapter 4 provides illustrated parts lists.

Schematic diagrams of the System I cabinet circuitry are included as a supplement to this manual (SP-286). Refer to the Schematic Package Supplement included with the *game kit operators manual* for the game cartridge schematic, control-panel wiring diagrams, and any other diagrams pertaining exclusively to the game kit.



Chapter 1

Inspecting the Cabinet

⚠ WARNING ⚠

Do not plug in the cabinet until you have completed steps 1 through 3.

Please inspect your System I cabinet carefully to ensure that it has been delivered to you in good condition. Refer to Figure 4-1 for the location of the component parts of the cabinet. Table 1-1 lists space, power, and environmental requirements for the cabinet.

1. Examine the exterior of the cabinet for dents, chips, or broken parts.
2. Unlock and remove the front access panel. Unlock and open the coin door. From the top rear of the cabinet, remove the six attaching screws and lift off the rear access panel. Inspect the interior of the cabinet as follows:
 - a. Ensure that all plug-in connectors (on the cabinet harnesses) are firmly plugged in. Do not force connectors together. The connectors are keyed so they only fit in the proper orientation. *A reversed edge connector may damage a printed-circuit board (PCB) and will void the warranty.*
 - b. Ensure that all plug-in integrated circuits on each PCB are firmly plugged into their sockets.

Table 1-1 Installation Requirements

Characteristic	Requirement
Power Consumption	255 V-A, 210 W RMS typical with game components installed
Temperature	+ 5° to + 38° C (+ 37° to + 100° F)
Humidity	Not to exceed 95% relative
Line Voltage	105 to 132 VAC (or 200 to 264 VAC)
Width	25.50 in. (64.6 cm)
Depth	35 in. (89 cm)
Height	70 in. (178 cm)
Weight	327 lbs. (148 kg) maximum with game components installed

- c. Inspect the power cord for any cuts or dents in the insulation.
- d. Inspect the power supply. Make sure that the correct fuses are installed. (See Figure 1-2.) Check that the harness is plugged in correctly and that the fuse-block cover is mounted in place. Check that the green ground wire is connected.
- e. Inspect other major subassemblies, such as the video display, printed-circuit boards (PCBs), speakers, and the fluorescent tube. Make sure they are mounted securely and that the green ground wires are connected.

Control and Switch Information

Power On/Off Switch

The power on/off switch is located at the bottom rear of the cabinet. (See Figure 4-1.)

Volume Control

The volume control is located on the Audio PCB. (See Figure 1-1.) The volume control adjusts the level of sound produced by the game.

Coin Counters

The coin counter(s) is located on the left wall of the cabinet behind the front access panel. (See Figure 4-1.) The coin counter(s) records the number of coins entered.

Self-Test Switch

The self-test switch is located on the Audio PCB. (See Figure 1-1.) The self-test switch selects the Self-Test Mode to check game operation. Refer to the game kit operators manual for a complete description of self-test operation.

Option Settings

Refer to the self-test information in the game kit operators manual to set the options.

Power Supply Fuses

The power supply in your game contains three fuses. When you replace a fuse, use the identical type fuse with the same electrical rating. (See Figure 1-2.) Also, be sure to put the replacement fuse in the correct location.

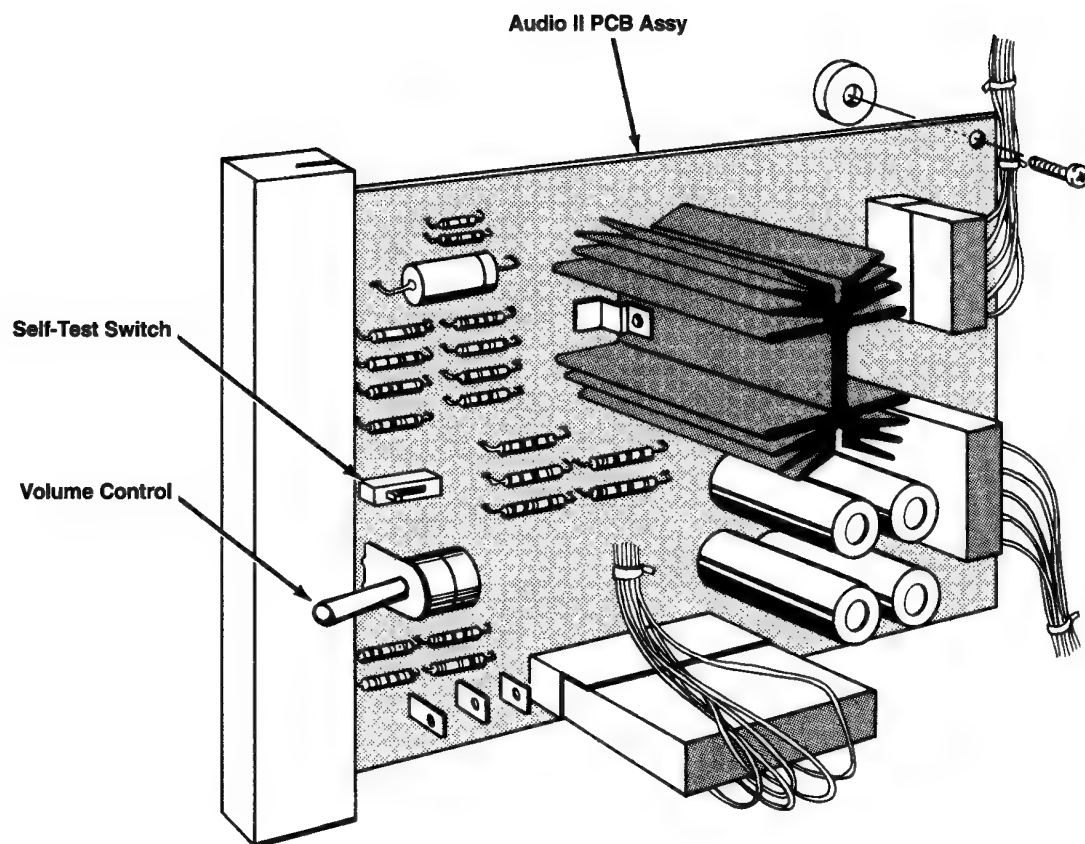


Figure 1-1 Control and Switch Locations

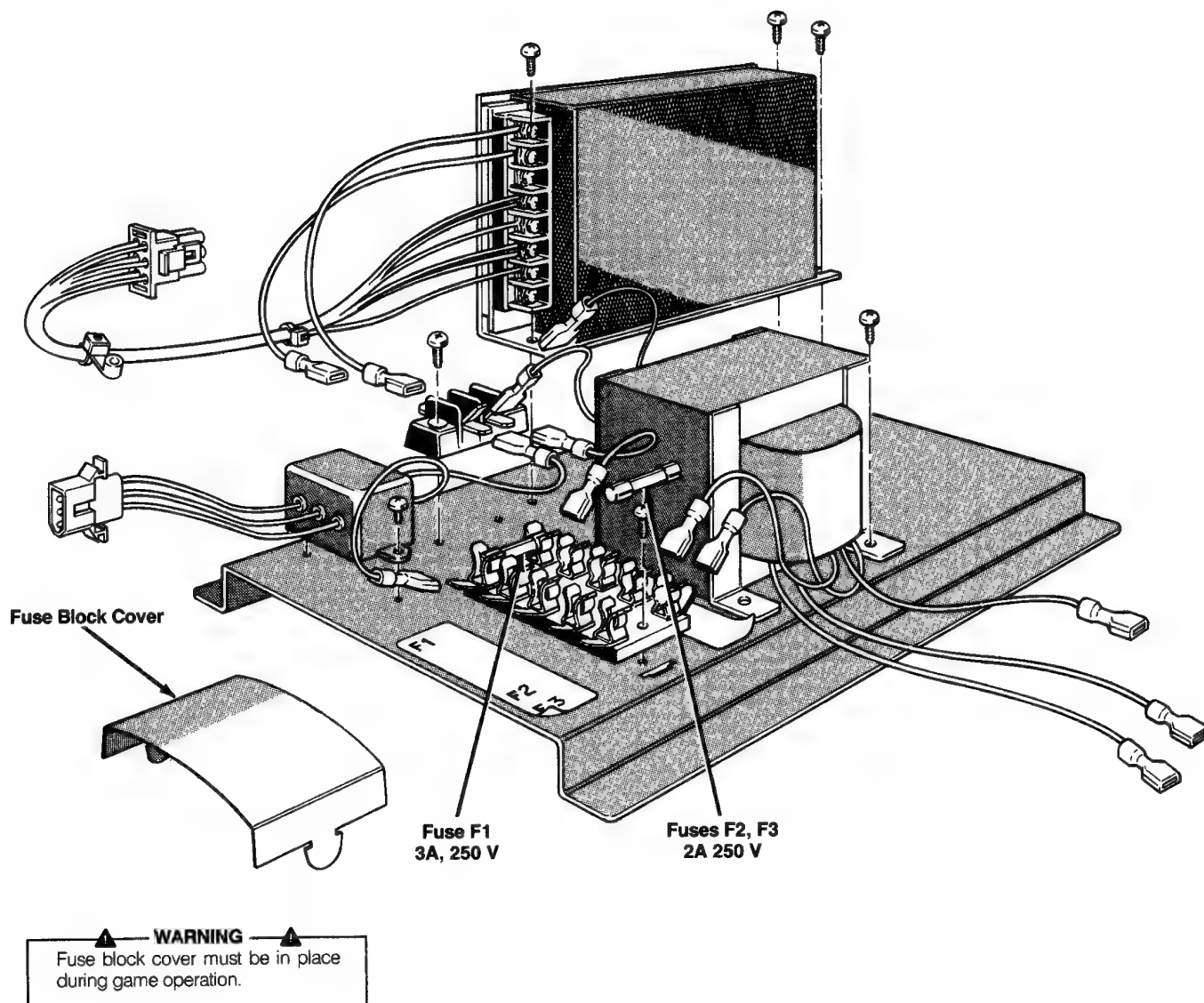
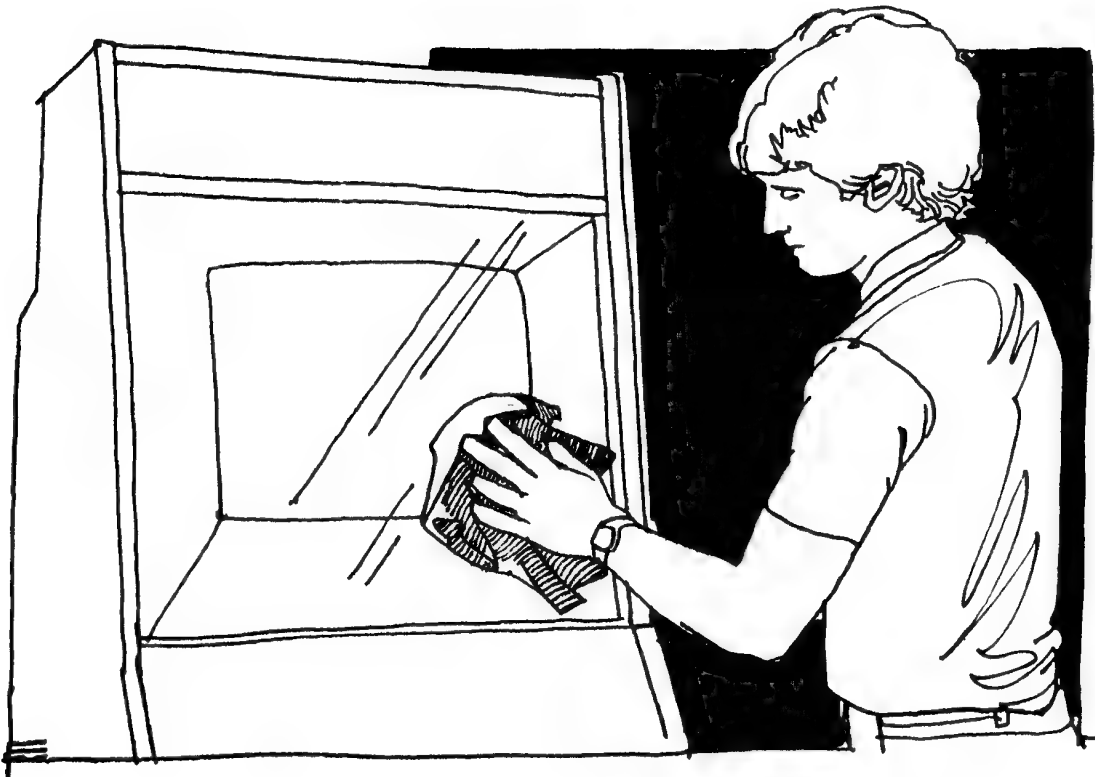


Figure 1-2 Switching/Linear (SL) Power Supply Fuse Locations

Maintenance

This chapter includes preventive and corrective maintenance procedures for components that are common to all System I™ cabinets. References are provided, where applicable, to the Maintenance chapter in the game kit operators manual for those components that are unique to a specific game. To assure maximum trouble-free operation from this game, we recommend that preventive maintenance be performed as described in this chapter *and* in the Maintenance chapter of the game kit operators manual.

Removal, disassembly, reassembly, and replacement procedures are provided for System I cabinet components that may require corrective maintenance. Appropriate references are provided to Chapter 4, Illustrated Parts Lists, to aid in locating the parts of this cabinet that are mentioned, but not illustrated, in the maintenance procedures.



Chapter 2

Preventive Maintenance

Preventive maintenance includes cleaning the coin mechanism, interior components of the cabinet, and display shield. How often preventive maintenance is performed depends upon the game environment and frequency of play. However, for those components listed in Table 2-1 Recommended Preventive-Maintenance Intervals, we recommend that preventive maintenance be performed at the intervals specified.

NOTE

Refer to the Maintenance chapter in the game kit operators manual for preventive maintenance procedures for the player controls on the control panel.

Preventive-Maintenance Intervals

The preventive-maintenance intervals specified in Table 2-1 are the recommended minimum requirements for the components listed.

WARNING

To avoid possible electrical shock, turn off and unplug the game before performing any maintenance procedures.

1. Re-seat the various connectors between the power supply and PCBs to ensure good electrical contact.
2. Verify correct video display adjustments using the self-test screens described in the game kit operators manual.

Removing the Control Panel

Refer to the Maintenance chapter in the game kit operators manual for control panel removal procedures.

Table 2-1 Recommended Preventive-Maintenance Intervals

Component	Maintenance Interval
Coin Mechanism	Clean at least every three months.
Interior Components	Clean at least every six months.

Cleaning

Cleaning the Coin Mechanism

Use a soft-bristled brush to remove loose dust or foreign material from the coin mechanism. A toothbrush can be used to remove any stubborn build-up of residue in the coin path. After cleaning the coin mechanism, blow out all of the dust with compressed air.

Cleaning the Display Shield

The display shield can be cleaned with any non-abrasive household cleaner.

Cleaning the Interior Components

Perform the following procedure to clean the electrical assemblies inside the cabinet.

WARNING

Turn off the cabinet power, but do not unplug the power cord before cleaning inside the cabinet. The power cord provides a ground path for stray static voltages that can be present on the cleaning tools.

1. Unlock and remove the front access panel from the cabinet.
2. Use a Phillips screwdriver to remove the six screws securing the display access panel to the top rear of the cabinet.
3. Discharge the high-voltage from the cathode-ray tube (CRT) before proceeding. The display assembly contains a circuit for discharging the high voltage to ground when power is removed. However, to make certain, always discharge the display as follows.
 - a. Attach one end of a large, well-insulated, 18-gauge jumper wire to ground.
 - b. Momentarily touch the free end of the grounded jumper to the CRT anode by sliding it under the anode cap.
 - c. Wait two minutes and repeat part b.

CAUTION

Be extremely careful when cleaning the electrical components inside the cabinet. Avoid touching the electrical components with any solid object other than the soft bristles of the vacuum attachment or paintbrush.

4. Use a vacuum cleaner with a soft long-bristled brush attachment or a soft-bristled paintbrush to remove loose dirt and dust accumulation on the electrical assemblies inside the cabinet.

Corrective Maintenance

Corrective maintenance consists of removal, disassembly, reassembly, and replacement of cabinet components. The following procedures are provided for components that may require corrective maintenance.

NOTE

Refer to the Maintenance chapter in the game kit operators manual for the corrective maintenance procedures for the player controls.

Removing the Display Shield and Bezel

Perform the following procedure to remove/replace the display shield and bezel. (See Figure 2-1.)

1. Remove the control panel as described in the Maintenance chapter of the game kit operators manual.
2. Use a Phillips screwdriver to remove the two screws securing the speaker grille to the cabinet.
3. Grasp the display shield on the bottom edge and gently pull it out about one-half inch from the cabinet.
4. Gently lower the display shield to free it from the grooved molding under the attraction panel.
5. Use a flat-head screwdriver to remove the staples, if any, securing the bezel to the cabinet.
6. Remove the bezel.

Removing the Video Display

WARNING**High Voltage**

The video display contains lethal high voltages. To avoid injury, do not attempt to service this display until you observe all precautions necessary for working on high-voltage equipment.

X-Radiation

The video display has been designed to minimize X-radiation. However, to avoid possible exposure to soft X-radiation, **never** modify the high-voltage circuitry.

Implosion Hazard

The cathode-ray tube can implode if struck or dropped. Shattered glass can cause injury within a six-foot radius. Use care when handling the display.

Perform the following procedure to remove/replace the video display. (See Figure 2-2.)

1. Turn the game power off and wait two minutes. Unplug the power cord.
2. Use a Phillips screwdriver to remove the six screws securing the upper rear access panel to the cabinet.
3. Remove the display shield and bezel as previously described.
4. Discharge the high-voltage from the cathode-ray tube (CRT) before proceeding. The display assembly contains a circuit for discharging the high voltage to ground when power is removed. However, to make certain, always discharge the display as follows:
 - a. Attach one end of a large, well-insulated, 18-gauge jumper wire to ground.
 - b. Momentarily touch the free end of the grounded jumper to the CRT anode by sliding it under the anode cap.
 - c. Wait two minutes and repeat part b.
5. From the back of the cabinet, unplug the display-harness connectors and disconnect the ground wire.

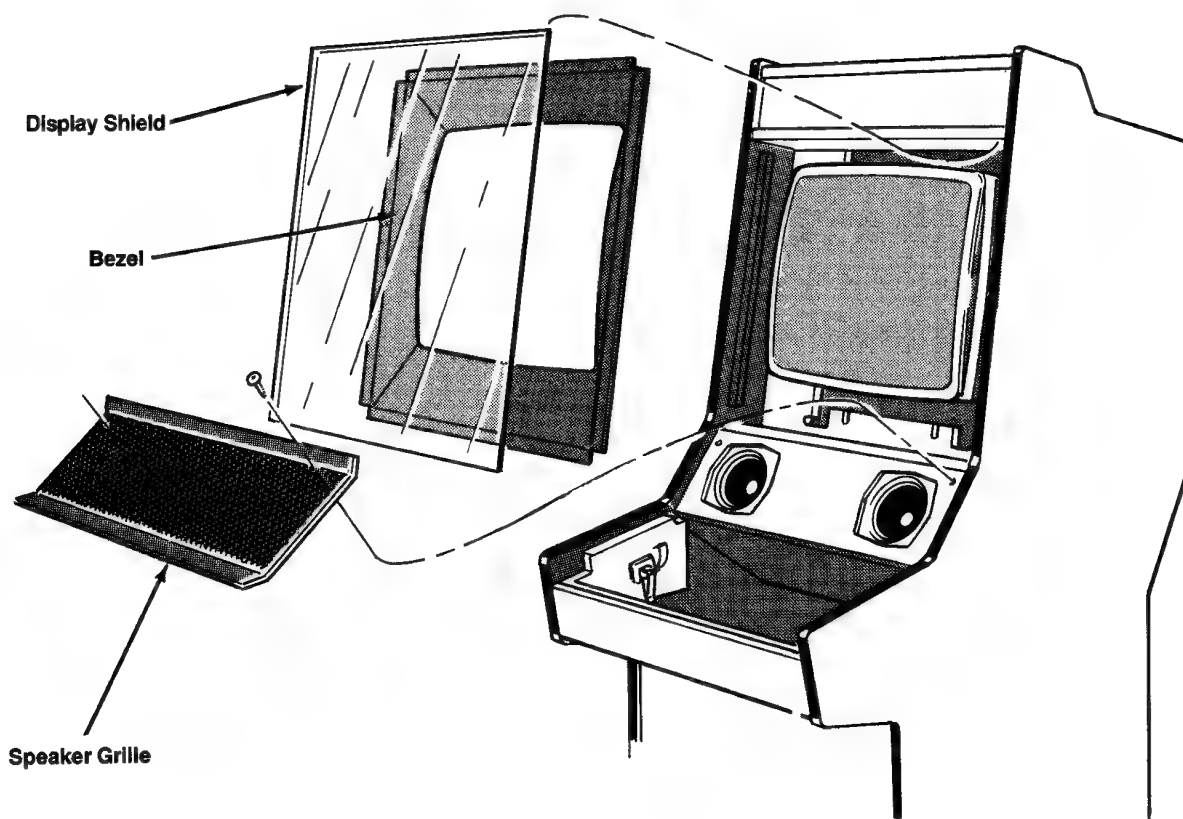


Figure 2-1 Display Shield and Bezel Removal

⚠ WARNING ⚠

To avoid dropping the video display, use extreme care when removing the display from the cabinet. We recommend that a second person *carefully* hold the display chassis from the back of the cabinet while the other person lifts it from the front of the cabinet.

Removing the Main PCB

Perform the following procedure to remove/replace the Main PCB. (See Figure 2-3.)

NOTE

The procedure for removing the Cartridge PCB is included in the Maintenance chapter of the game kit operators manual.

6. From the front of the cabinet, use a 3/8-inch wrench to remove the four nuts and washers securing the display to the cabinet.
7. Carefully slide the display out through the front of the cabinet.
8. Replace the display in the reverse order of removal.

NOTE

Whenever the cathode-ray tube is replaced, readjust the brightness, purity, and convergence as described in the display manual.

1. Turn the cabinet power off.
2. Unlock and remove the front access panel from the cabinet.
3. Disconnect the harness connectors from the Main PCB.
4. Use a Phillips screwdriver to remove the four screws securing the ground plane to the cabinet.
5. Carefully remove the ground plane, with the PCBs attached, and place on a clean surface.
6. Use a Phillips screwdriver to remove the four screws securing the Main PCB to the ground plane.
7. Gently disconnect the Main PCB from the Cartridge PCB.

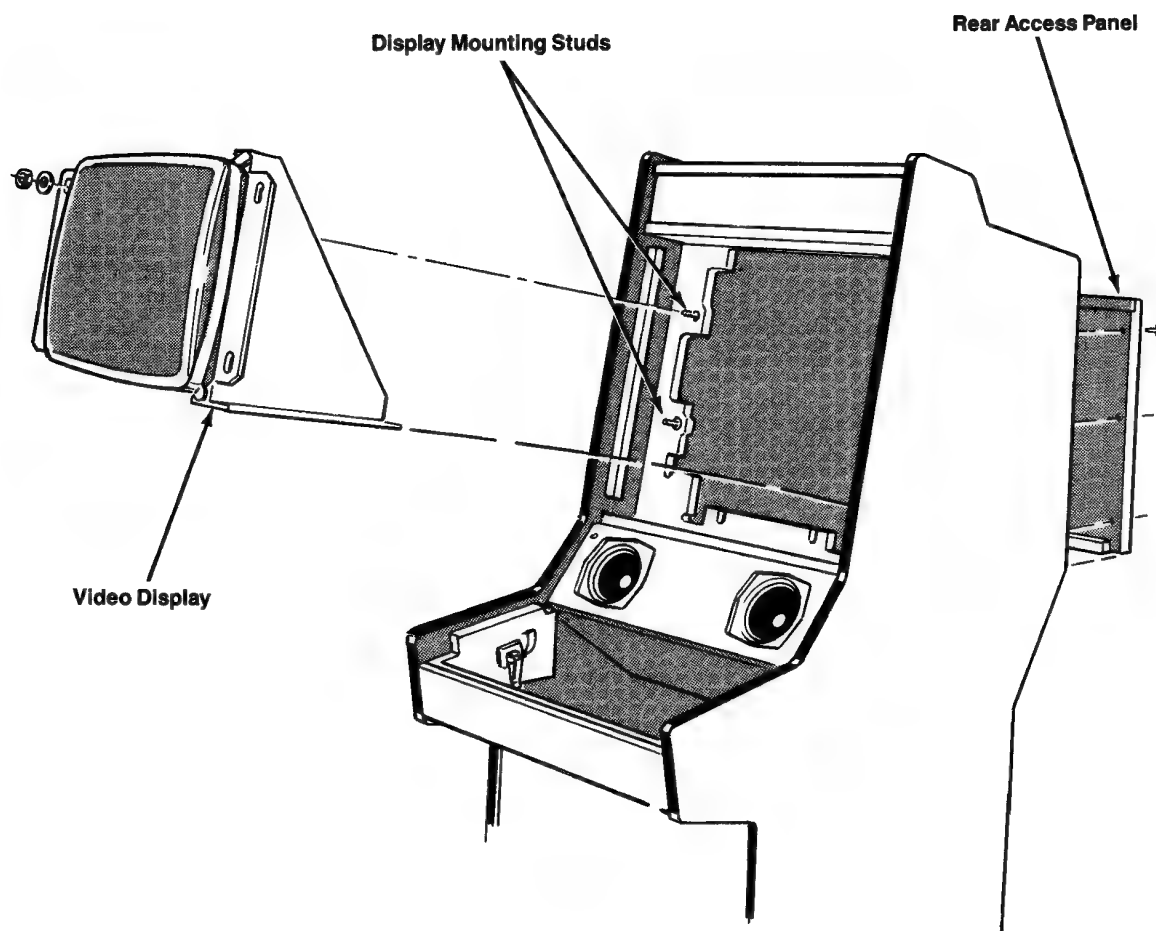


Figure 2-2 Video Display Removal

8. Replace the Main PCB in the reverse order of removal. Make sure that the Main PCB is fully inserted into the Cartridge PCB edge connectors and the ground strap is properly connected to the ground plane. Refer to Figure 2-3 for the ground strap and harness connector locations.

Removing the Fluorescent-Light Assembly

Perform the following procedure to remove/replace the fluorescent-light assembly. (See Figure 2-4.)

1. Turn the game power off.
2. From the rear of the cabinet, use a Phillips screwdriver to remove the six screws securing the upper rear access panel to the cabinet.
3. Disconnect the fluorescent-light harness connector.
4. From the front of the cabinet, use a 1/8-inch hex driver to remove the three screws securing the attraction retainer to the top of the cabinet.
5. Grasp the top edge of the attraction shield and film and lift out of the cabinet.
6. Gently twist the fluorescent tube a quarter turn and remove from the sockets.
7. Use a Phillips screwdriver to remove the two screws securing the fluorescent-light bracket to the cabinet.
8. Lift the fluorescent-light assembly out of the front of the cabinet.
9. Replace the fluorescent-light assembly in the reverse order of removal.

Removing the Speakers

Perform the following procedure to remove/replace the speakers. (See Figure 2-5.)

1. Remove the control panel as described in the Maintenance chapter of the game kit operators manual.
2. Use a Phillips screwdriver to remove the two screws holding the speaker grille to the cabinet and the four screws securing each speaker to the cabinet.

CAUTION

Do not touch the speaker cones when handling the speakers. The cone material is fragile and can be easily damaged.

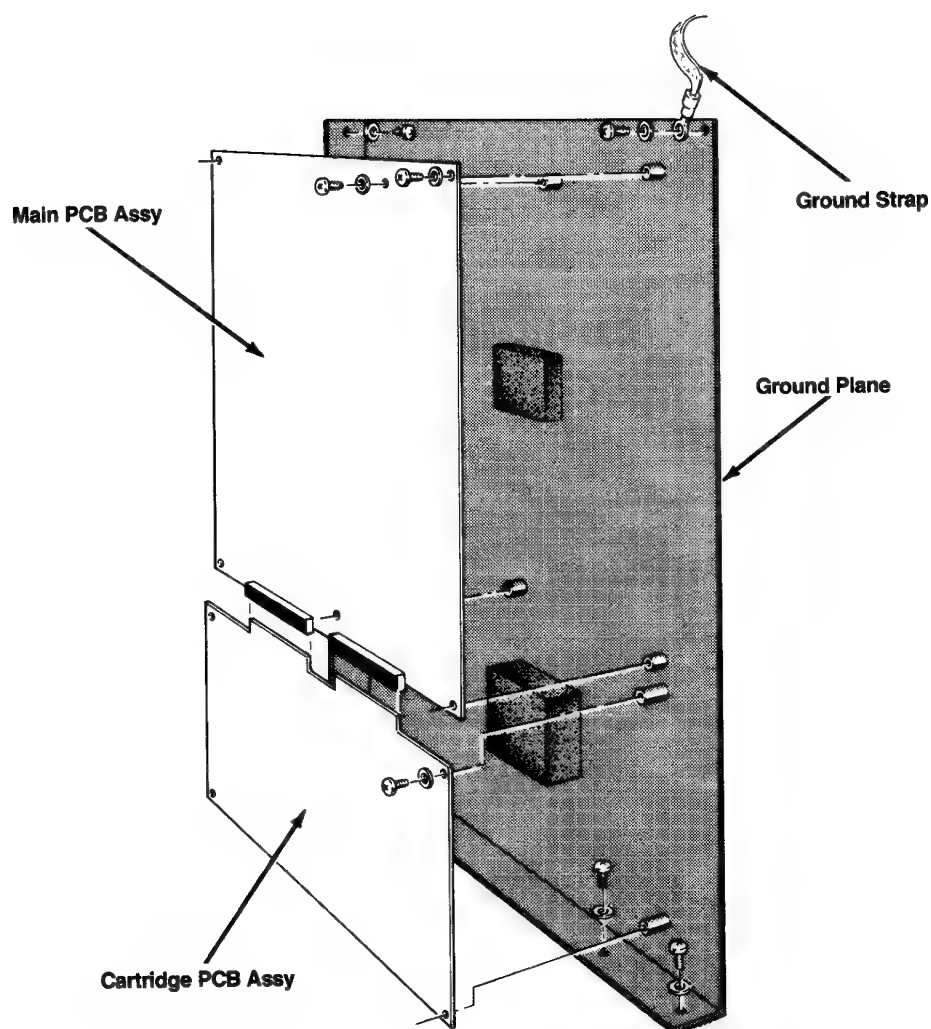


Figure 2-3 Main PCB Removal

3. Lift the speaker out just far enough to disconnect the two speaker wires from the back of the speaker.
4. Replace the speaker in the reverse order of removal. Ensure that the speakers are properly phased by placing the same color-coded connector on the same tab on each speaker.

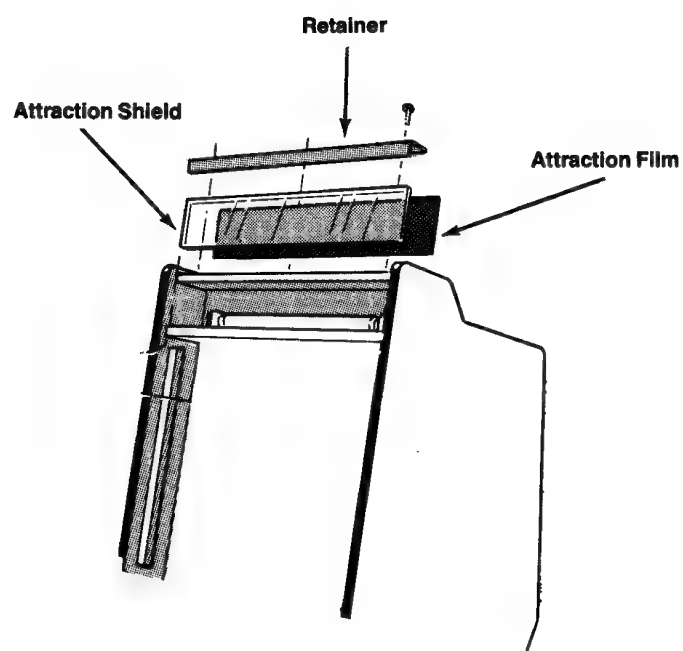


Figure 2-4 Fluorescent-Light Assembly Removal

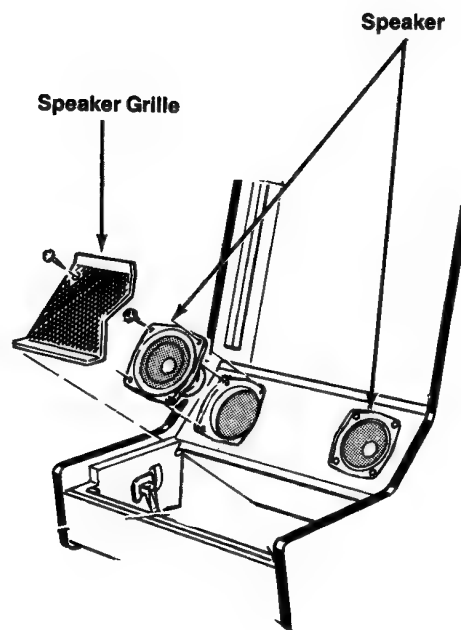


Figure 2-5 Speaker Removal

1

2

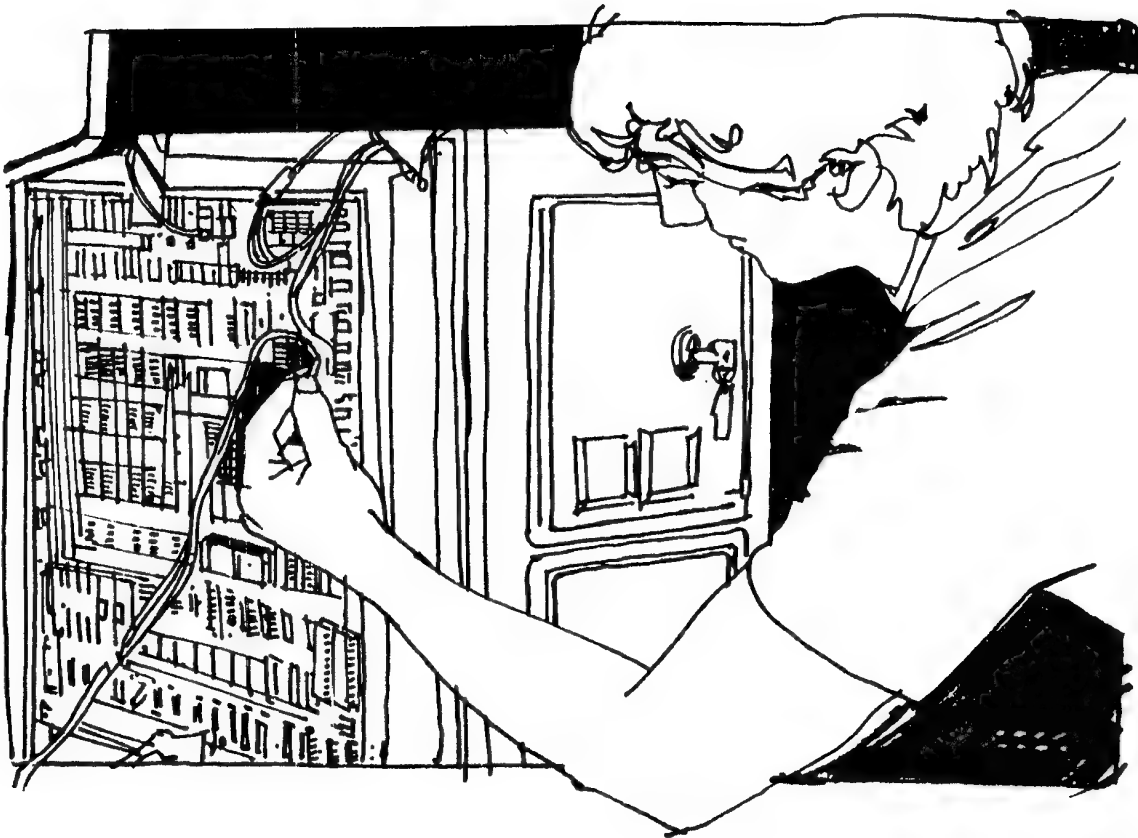
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Troubleshooting

The information in this chapter discusses troubleshooting aids and techniques to assist the service technician when trouble is suspected in a game. Most troubles can be located quickly by following the information in this chapter. However, if problems persist, contact your Atari Games Corporation Customer Service Office, listed on the inside front cover of this manual, for assistance.

NOTE

We recommend that troubleshooting and repair procedures be performed by a qualified service technician.



Chapter 3

Troubleshooting Aids

Troubleshooting aids are provided throughout this manual and the schematic package supplement, and also in the game kit operators manual and its schematic package supplement. The following information is intended to acquaint the service technician with the portions of these documents that contain useful troubleshooting and repair information.

Assembly and Component Locations

The parts lists in Chapters 4 of this manual and in the game kit operators manual illustrate the locations of assemblies and components. Printed-circuit board (PCB) illustrations aid in rapidly locating components shown on the corresponding schematic diagram(s).

Diagrams

The schematic package supplement for this manual and for the game kit operators manual contain schematic diagrams with component locations, active component type numbers, and electrical values.

Troubleshooting Techniques

! WARNING !

To avoid electrical shock, turn off the game power before attempting to troubleshoot this game.

The following troubleshooting steps are arranged in a sequence recommended for locating a defective component. The procedure begins with a check of the simple trouble possibilities and progresses to more extensive procedures for localizing the problem to an assembly or major circuit, and then to a defective component.

Check Fuses

Check for open fuses. Refer to the power supply parts list in Chapter 4 and to the Display Manual for the location and rating of each fuse used in this game. Make sure that replacement fuses are the proper type and rating.

Check Power-Supply Voltages

Improper operation of all circuits usually indicates a power supply problem. Be sure that the proper line voltage is available to the power supply. Refer to the label on the power supply for its voltage rating.

Localize Trouble

Determine the trouble symptom. Use the wiring diagrams in the schematic package supplement to determine which assemblies or major circuits could cause the trouble. Per-

form the self-test procedure provided in the game kit operators manual.

Visual Check

Visually check for obvious problems in the portion of the game where the trouble is suspected. For example, check for loose or defective solder connections, integrated circuits loose in their sockets, loose cable connections, broken wires, and damaged PCBs or components.

Check Individual Components

Check soldered-in passive components (e.g., resistors, capacitors, diodes) by disconnecting one end to isolate the measurement from the effects of the surrounding circuitry. Often, direct substitution is the most practical way to determine if a component is faulty. However, eliminate the possibility of some other circuit problem that could damage the substitute component.

Repair the Assembly

CAUTION

Soldered-in transistors and integrated circuits are difficult to remove without damaging the printed-circuit board or component. Refer to the information in this chapter pertaining to soldering and replacing integrated circuits and transistors.

Repair or replace the defective part. Refer to Chapter 2 and information in this chapter for special removal and replacement procedures. Check for proper operation of the repaired circuit.

Soldering Techniques

Observe the following recommendations when removing or replacing components soldered to a PCB. Poor soldering practices can damage a PCB or heat-sensitive electrical components.

Choosing the proper soldering iron is essential before attempting to remove or replace soldered-in components. Excessive heat is a common cause of damage to a component or PCB. However, transient voltages from solder guns or improperly grounded soldering irons can also damage certain voltage-sensitive semiconductor devices. Refer to *Troubleshooting Static-Sensitive Devices* for more specific information.

A 15- to 27-watt pencil-tip soldering iron is recommended to avoid separating the etched circuit wiring from the board material and to avoid damaging active components. A temperature-controlled soldering station rated at

700°F with a fine cone or a very fine chisel tip can also be used.

CAUTION

Solder guns are not recommended for removing or replacing soldered-in components on a printed-circuit board. The added possibility for overheating and the large transient voltage induced by the solder gun could cause damage to heat- or voltage-sensitive devices.

The following additional equipment is recommended for removing and replacing soldered-in components:

- **Solder Sucker**—Hand-operated vacuum tool used to remove liquified solder from the PCB. We recommend the top-of-the-line Soldapull® brand.
- **Solder Wick**—Resin-soaked copper braid used for removing excess solder from the lead connections on the PCB. See *Removing Integrated Circuits* for precautions relating to the use of a solder wick on a multi-layer PCB with plated-through holes.
- **Flux Remover**—Non-corrosive chemical used to clean foreign material from the PCB before soldering and to remove any flux residue where components have been replaced. Also used to clean any foreign material from the PCB during preventive maintenance. Isopropyl alcohol is recommended.
- **Acid Brush**—Small stiff-bristled paint or toothbrush used with flux remover to clean flux and other foreign material from the PCB.

Removing Integrated Circuits

The easiest and safest method for removing soldered-in integrated circuits (IC) from a PCB is to cut off each pin as close to the IC case as possible with a tip dyke (diagonal cutter) as shown in Figure 3-1.

Use the proper soldering iron as previously described under *Soldering Techniques*. Then, to avoid excessive heat buildup in one area of the PCB, apply heat directly to each

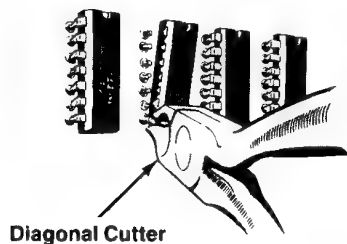


Figure 3-1 Removing IC (Cut-Pin Method)

pin in a random order. Remove the loosened pin with the tip of the soldering iron or a needle-nose pliers as shown in Figure 3-2. Allow a moment for the PCB to cool before proceeding to the next pin. Apply just enough heat to remove any stubborn pins.

For a multi-layer PCB with plated-through holes, use a solder sucker to remove the remaining solder from inside each hole as shown in Figure 3-3. If possible, suck the solder from the opposite side of the PCB from where the heat is applied.

Use a solder wick to remove excess solder from around the lead connection pads on the top and/or bottom surface of the PCB as shown in Figure 3-4.

CAUTION

Do not use a solder wick to remove solder from inside plated-through holes. The heat required for the solder wick to remove the solder from inside the hole could damage the PCB.

Use an integrated-circuit (IC) pulling tool to remove socketed ICs. Do not pry up on one end of the ICs, because the pins could be bent or broken.

Troubleshooting Static-Sensitive Devices

Certain precautions must be taken when working with static-sensitive devices, e.g., microprocessors, field-effect transistors (FET), complementary metal-oxide semiconductors (CMOS), and other large-scale integration (LSI) devices that use metal-oxide semiconductor (MOS) technology. Static charge buildup in a person's body or leakage from an improperly grounded soldering iron can cause static-sensitive device failure.

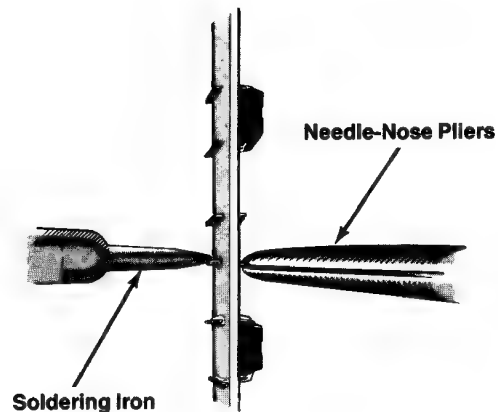


Figure 3-2 Removing IC Pins

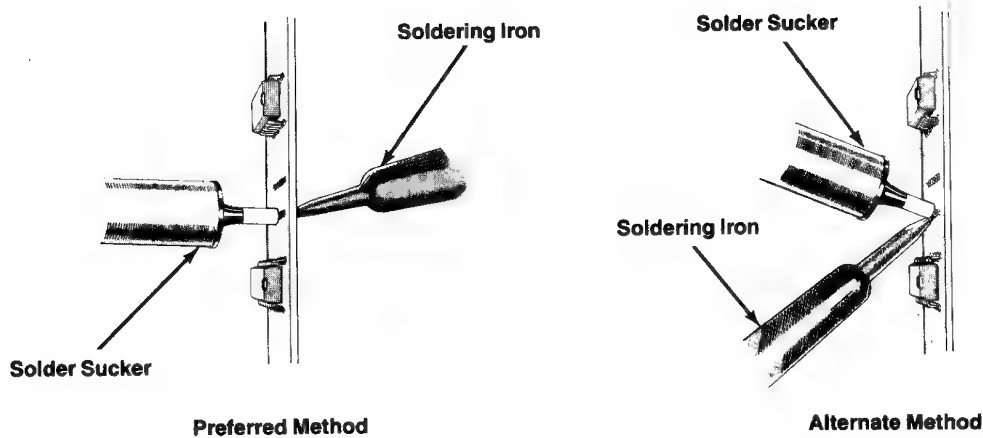


Figure 3-3 Removing Solder from Plated-Through Holes

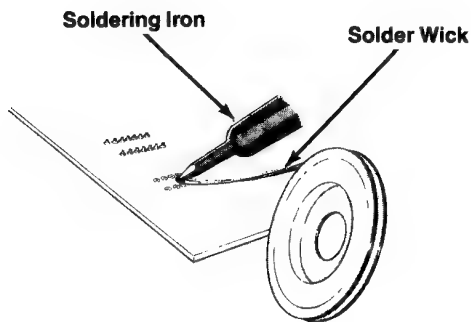


Figure 3-4 Removing Solder from Lead Connection Pads

Before handling a static-sensitive device or a PCB with such devices attached to it, ground any static voltage that may have accumulated in your body by touching an object that has been earth grounded. A bare wire wrapped

around your wrist and attached to an earth ground is effective when working extensively with static-sensitive devices. When soldering on a static-sensitive device, use a soldering iron with a properly grounded three-wire cord. (Refer to *Soldering Techniques* for a discussion of recommended soldering irons and procedures.)

A static-sensitive device can appear defective due to leakage on a PCB. Observe the precautions for grounding static voltages described in the preceding paragraph and clean both sides of the PCB with flux remover or an eraser before replacing what can be a good static-sensitive device. For discrete FETs, clean thoroughly between the gate, drain, and source leads.

Static-sensitive devices can be packaged in conductive foam or have a protective shorting wire attached to the pins. Remove the conductive foam just prior to inserting the device into its socket or soldering it to a PCB. Remove the shorting wire only *after* the device is inserted into its socket or *after* all the leads are soldered in place.

Illustrated Parts Lists

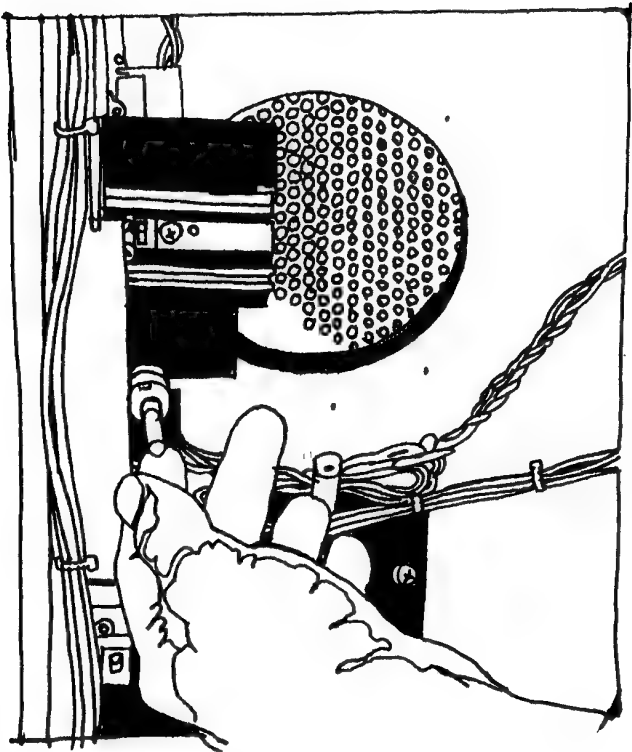
This chapter provides information you need to order parts for your game. Common hardware (screws, nuts, washers, etc.) has been deleted from most of the parts lists. However, a parts list is included for the hardware to mount the printed-circuit boards (PCBs) to the cabinet.

The PCB parts lists are arranged in alphabetical order by component. Each component subsection is arranged alphanumerically by reference designator or location.

Other parts lists are arranged alphanumerically by Atari part number. In these parts lists, all A-prefix numbers appear first. Following these are numbers in sequence evaluated up to the hyphen, namely 00- through 99-, then 000598- through approximately 201000-.

When ordering parts, please give the part number, part name, number of this manual, and serial number of your game. This will help us fill your order rapidly and correctly. We hope the results will be less downtime and more profit from your game.

Atari Customer Service numbers are listed on the inside front cover of this manual.



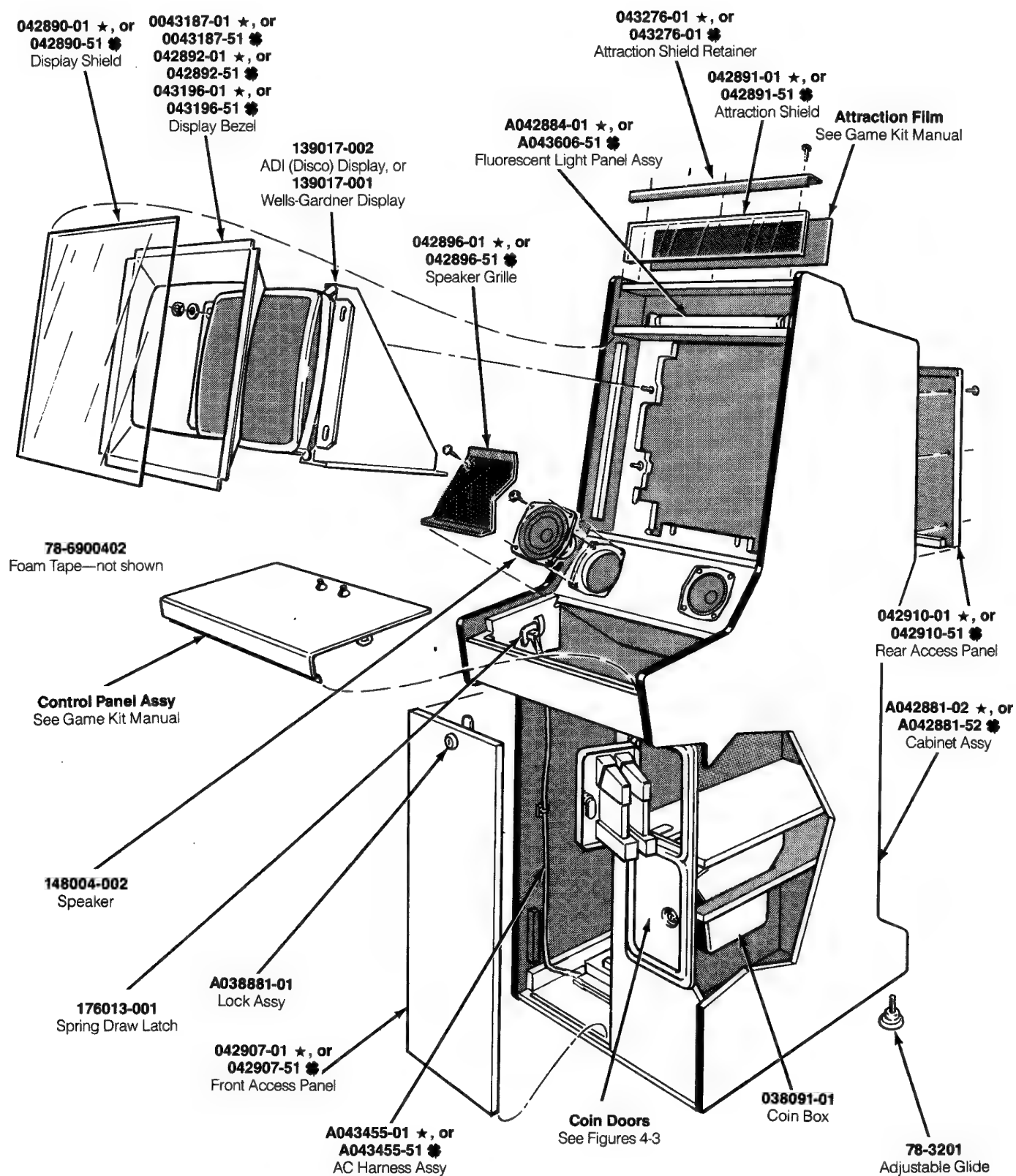


Figure 4-1 Cabinet-Mounted Assemblies
A043480-01 C
and A043480-51 C

★ Part used only in US-built cabinets
 ☼ Part used only in Ireland-built cabinets

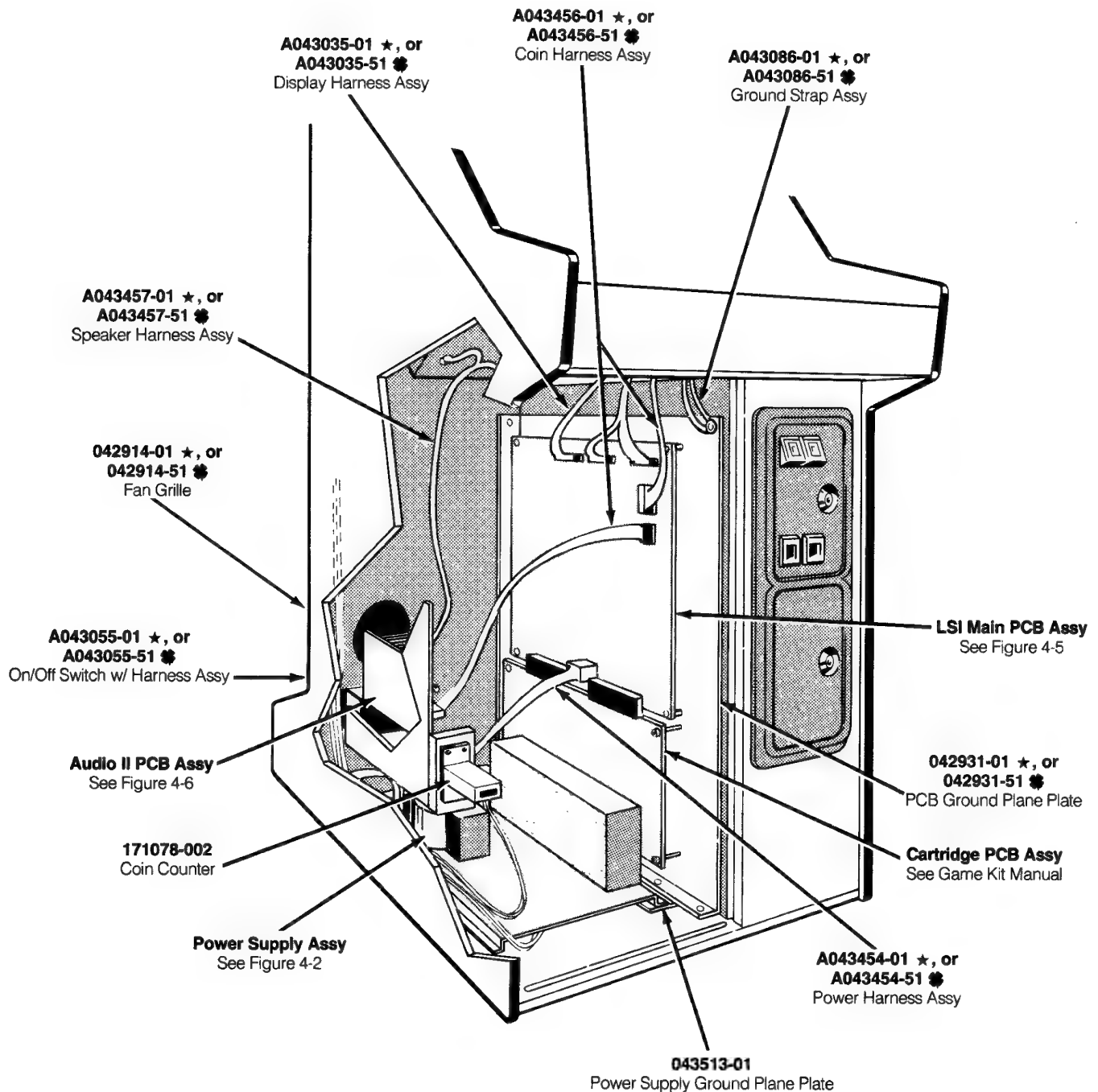


Figure 4-1 Cabinet-Mounted Assemblies, Continued
A043480-01 C
and A043480-51 C

Cabinet-Mounted Assemblies Parts List

Part No.	Description
A038881-01 ★	Lock Assembly
A042881-02 ★	Cabinet Assembly (A042881-52 ●)
US-Built Fluorescent Light Panel Assembly Only	
A042884-01 ★	Fluorescent Light Panel Assembly—consists of:
A005493-01 ★	Light Harness Assembly
A037540-01 ★	Ground Jumper Assembly
70-304 ★	18-Inch, 15 W, Cool White Fluorescent Tube
72-6408S ★	#4 × ½-Inch Pan-Head Cross-Recessed Tapping Screw
79-561816P ★	Wire Nut
99-11003 ★	Starter
99-11006 ★	Retaining Clip
99-11009 ★	Starter Socket
038151-01 ★	Jumper Wire
041981-01 ★	Lamp Bracket
042920-01 ★	Attraction Glass Panel
142028-001 ★	60 Hz Ballast Transformer
176015-110 ★	#10 × 5/8-Inch Pan-Head Cross-Recessed Deep-Thread Screw
179035-001 ★	Medium Bi-Pin Lamp Holder
Ireland-Built Fluorescent Light Panel Assembly Only	
A043606-51 ●	Fluorescent Light Panel Assembly—consists of:
A005493-02 ●	Light Harness Assembly
70-303 ●	18-Inch, 15 W, Cool White Fluorescent Tube
72-6610S ●	#6 × 5/8-Inch Pan-Head Cross-Recessed Tapping Screw
79-561816P ●	Wire Nut
99-11012 ●	1-Inch Clamp
035835-01 ●	12-Inch Y-Lead Connector
042920-51 ●	Attraction Glass Panel
142043-001 ●	220 V Ballast Transformer
171079-001 ●	220 V Starter
179220-001 ●	220 V Starter Socket
A043035-01 ★	Display Harness Assembly (A043035-51 ●)
A043055-01 ★	On/Off Switch with Harness Assembly (A043055-51 ●)
A043086-01 ★	Ground Strap Assembly, 8½ Inches Long, attached to Main LSI PCB ground plane plate (A043086-51 ●)
A043086-03 ★	Ground Strap Assembly, 4½ Inches Long, attached to control panel (A043086-53 ●)
A043454-01 ★	Power Harness Assembly (A043454-51 ●)
A043455-01 ★	AC Harness Assembly (A043455-51 ●)
A043456-01 ★	Coin Harness Assembly (A043456-51 ●)
A043457-01 ★	Speaker Harness Assembly (A043457-51 ●)
78-3201	Adjustable Glide
78-6900402	1/4-Inch × 1/8-Inch Foam Tape (48 inches required; used on control panel and attraction glass)
99-15066	Screw Clamp
038091-01	Molded Coin Box
042890-01 ★	Display Shield (042890-51 ●)
042891-01 ★	Attraction Shield (042891-51 ●)
042896-01 ★	Speaker Grille (042896-51 ●)
042907-01 ★	Front Access Panel (042907-51 ●)

Cabinet-Mounted Assemblies Parts List, Continued

Part No.	Description
042910-01 ★	Rear Access Panel (042910-51 ☛)
042914-01 ★	Fan Grille (042914-51 ☛)
043187-01 ★	Horizontal Display Bezel (043187-51 ☛); Acceptable substitute is part no. 042892-01 ★ (042892-51 ☛)
043196-01 ★	Vertical Display Bezel (043196-51 ☛)
043276-01 ★	Attraction Shield Retainer (043276-51 ☛)
043513-01	Power Supply Ground Plane Plate
139017-002	ADI (formerly known as Disco) 19-Inch Color Raster Display (Model DMC 2090DT-2C) OR
139017-001	Wells-Gardner 19-Inch Color Raster Display (Model 19K4914)
148004-002	4 ½ -Inch Round, 8 Ω, 10 W Speaker
171078-002	Non-Resettable Coin Counter, 12 VDC
176013-001	Spring Draw Latch
178093-001	Fan Guard
<i>The following are technical information supplements to this game:</i>	
TM-210	ADI (formerly known as Disco) 19-Inch Color Raster Display Manual
TM-283	Wells-Gardner 19-Inch Color Raster Display Manual
TM-286	Atari System I Operators Manual
SP-286	Atari System I Schematic Package Supplement
CO-210-01	ADI 19-Inch Color Raster Display Service Manual Supplement
CO-286-01	Atari System I Operators Manual and Schematic Package Supplement

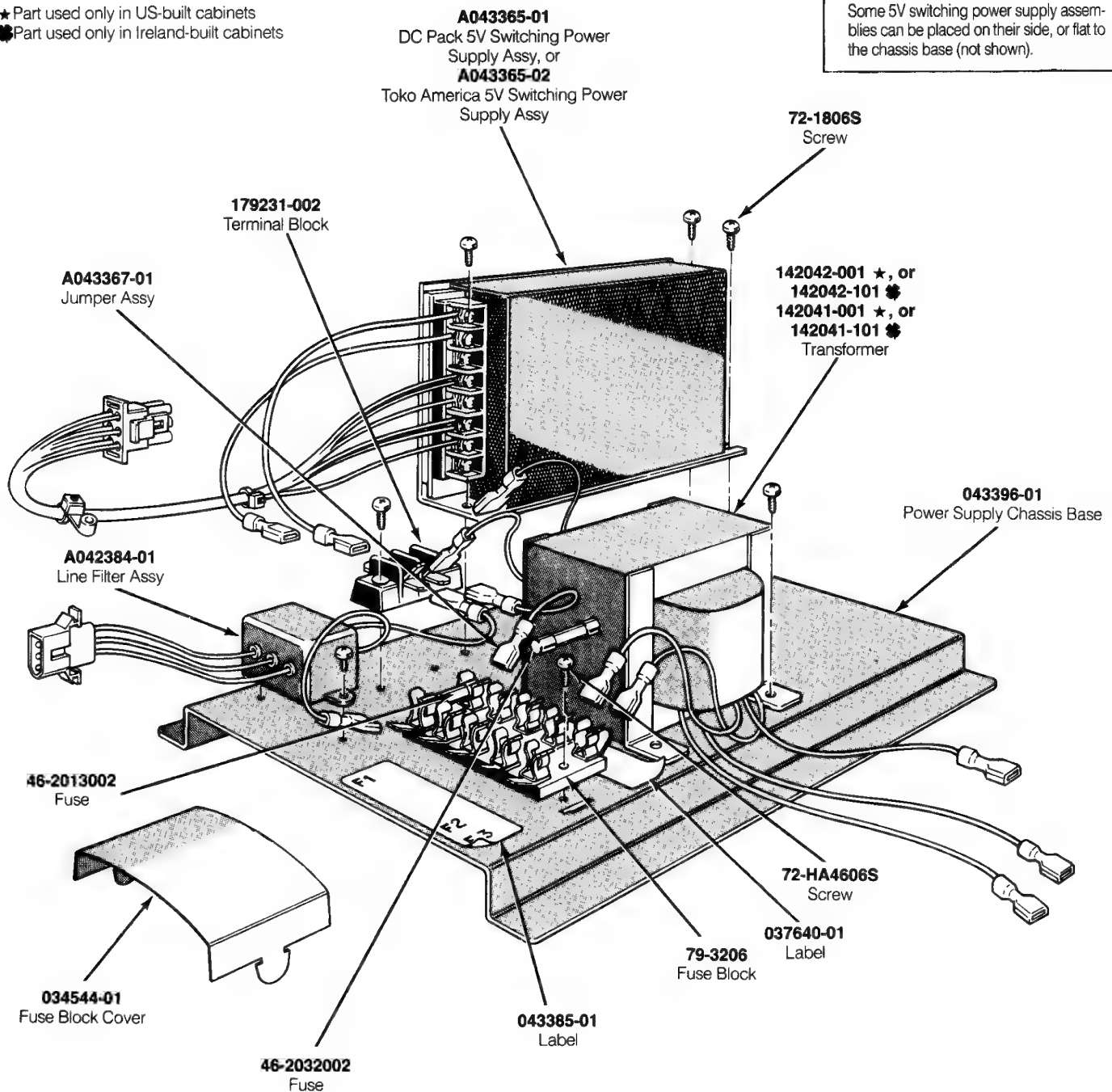
★ Part used only in US-built cabinets

☛ Part used only in Ireland-built cabinets

- ★ Part used only in US-built cabinets
 ☼ Part used only in Ireland-built cabinets

NOTE

Some 5V switching power supply assemblies can be placed on their side, or flat to the chassis base (not shown).



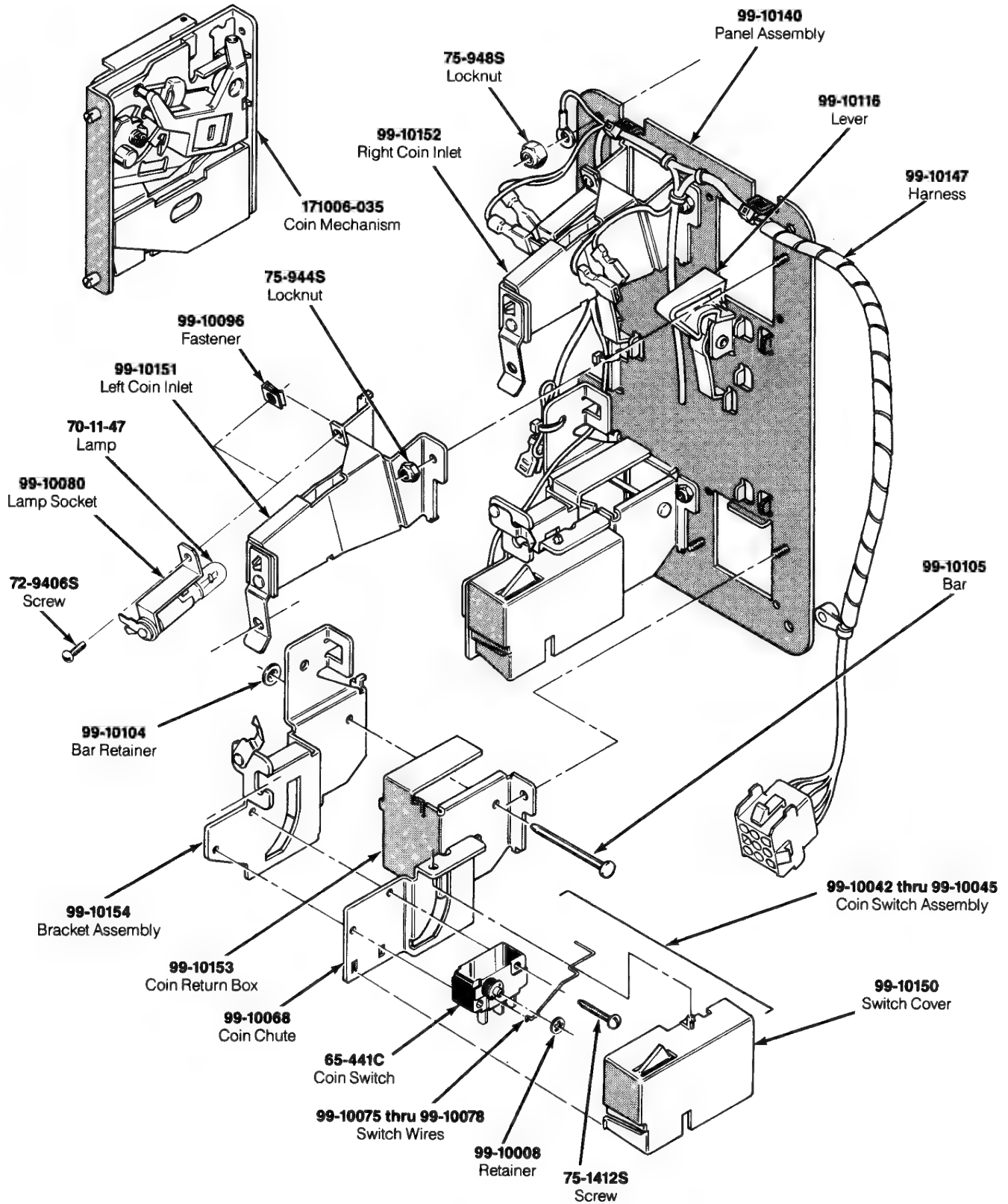
**Figure 4-2 Switching/Linear (SL) Power Supply Assembly
 A043363-01 D**

Switching/Linear (SL) Power Supply Assembly Parts List

Part No.	Description
A042384-01	Line Filter Assembly
A043365-01	DC Pack Co. Ltd. 5V Switching Power Supply Assembly
A043365-02	Toko America, Inc. 5V Switching Power Supply Assembly
A043367-01	Jumper Assembly
46-2013002	250 V Slow-Blow 3 A Fuse
46-2032002	250 V Normal-Blow 2 A Fuse
72-HA4606S	#6-32 × 3/8-Inch Cross-Recessed Pan-Head Thread-Forming Screw
72-1806S	#8-32 × 3/8-Inch Cross-Recessed Pan-Head Thread-Forming Screw
79-3206	5-Position Fuse Block
034544-01	Fuse Block Cover
043385-01	Power Supply Label (Fuses)
043396-01	Power Supply Chassis Base
142042-001 ★	Transformer (142042-101 ●); Acceptable substitute is part no. 142041-001 ★ (142041-101 ●)
179231-002	2-Position Terminal Block
<i>The following items are technical information supplements to this game:</i>	
CO-284-01	Schematic and Spare Parts List for DC Pack Co. Ltd. 5V Power Supply
CO-284-04	Schematic and Spare Parts List for Toko America, Inc. 5V Power Supply

★ Part used only in US-built cabinets

● Part used only in Ireland-built cabinets



**Figure 4-3 Coin Acceptors, Inc. Coin Door Assembly
171027-001 A**

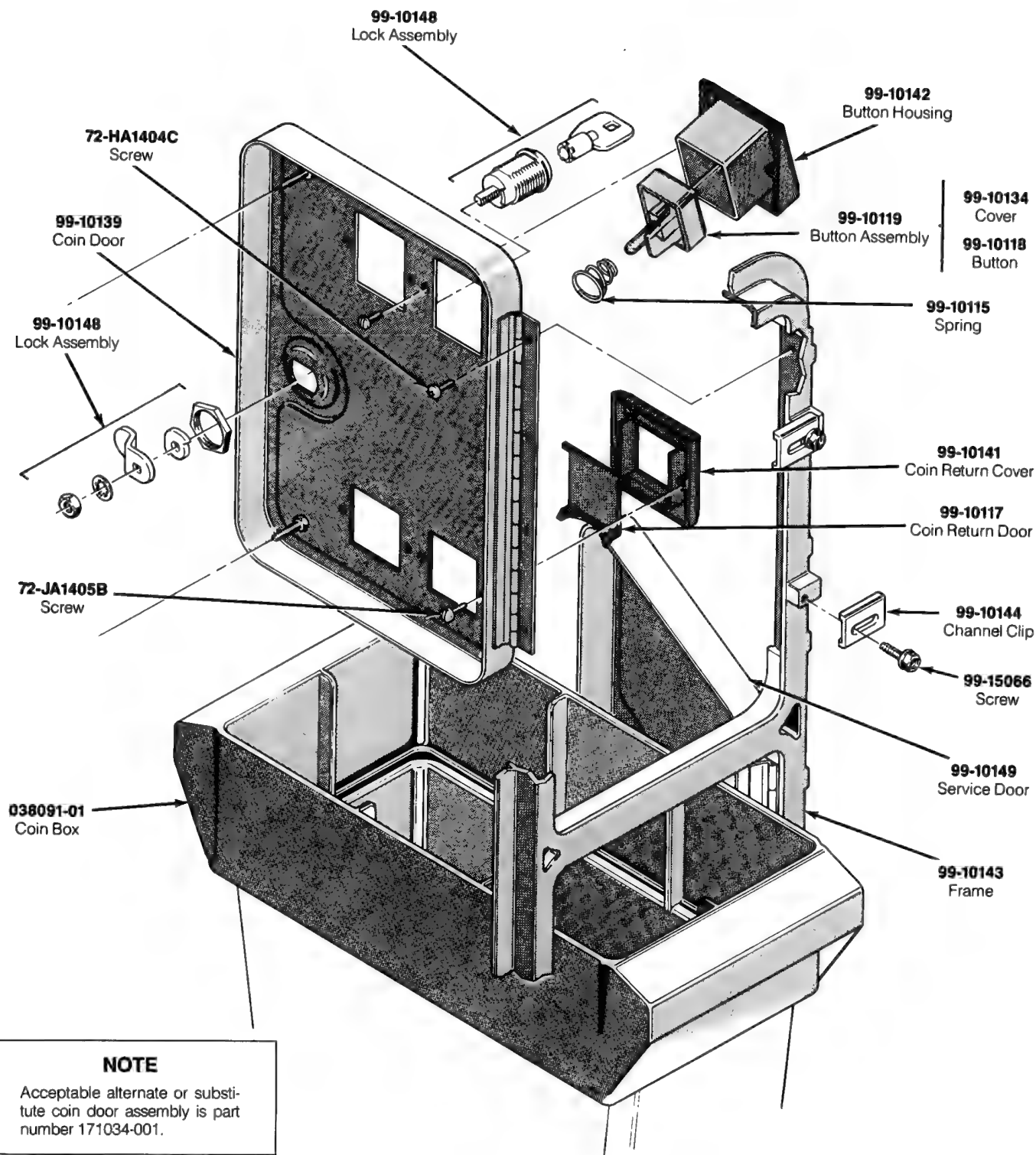


Figure 4-3 Coin Acceptors, Inc. Coin Door Assembly, continued
171027-001 A

Coin Acceptors, Inc. Coin Door Assembly Parts List

Part No.	Description
65-441C	Coin Switch
70-11-47	Miniature Bayonet Lamp
72-9406S	#4-40 × 3/8-Inch Truss-Head Screw
72-HA1404C	#4-40 × 1/4-Inch Pan-Head Screw
72-JA1405B	#4-40 × 0.31-Inch Pan-Head Screw
75-1412S	#4-40 × 3/4-Inch Pan-Head Screw
75-994S	#4-40 Locknut
99-10008	Retainer
99-10042	Coin Switch Assembly for Belgian 5 Fr and U.S. \$.25
99-10043	Coin Switch Assembly for German 1 DM, Japanese 100 Yen, Swiss 1 Fr
99-10044	Coin Switch Assembly for German 2 DM, Italian 100 L, U.S. \$1.00
99-10045	Coin Switch Assembly for Australian \$.20, German 5 DM, British 10 P
99-10068	Coin Return Chute
99-10075	Switch Wire (included in coin switch assembly 99-10043)
99-10076	Switch Wire (included in coin switch assembly 99-10042)
99-10077	Switch Wire (included in coin switch assembly 99-10044)
99-10078	Switch Wire (included in coin switch assembly 99-10045)
99-10080	Lamp Socket
99-10081	Key Holder
99-10096	Fastener
99-10104	Bar Retainer
99-10105	Bar
99-10115	Spring
99-10116	Plastic Coin Return Lever
99-10117	Steel Coin Return Door
99-10118	Amber Coin Return Button
99-10119	Amber Coin Button for U.S. \$.25
99-10134	Coin Button Cover
99-10139	Coin Door
99-10140	Coin Door Inner-Panel Assembly
99-10141	Die-Cast Coin Return Cover
99-10142	Die-Cast Button Housing
99-10143	Coin Door Frame
99-10144	Channel Clip
99-10147	Harness
99-10148	Lock Assembly
99-10149	Service Door
99-10150	Switch Cover
99-10151	Left Coin Inlet
99-10152	Right Coin Inlet
99-10153	Coin Return Box
99-10154	Bracket Assembly
99-15066	Screw for Clamp
171006-035	Metal Coin Mechanism for U.S. \$.25

CONTENTS

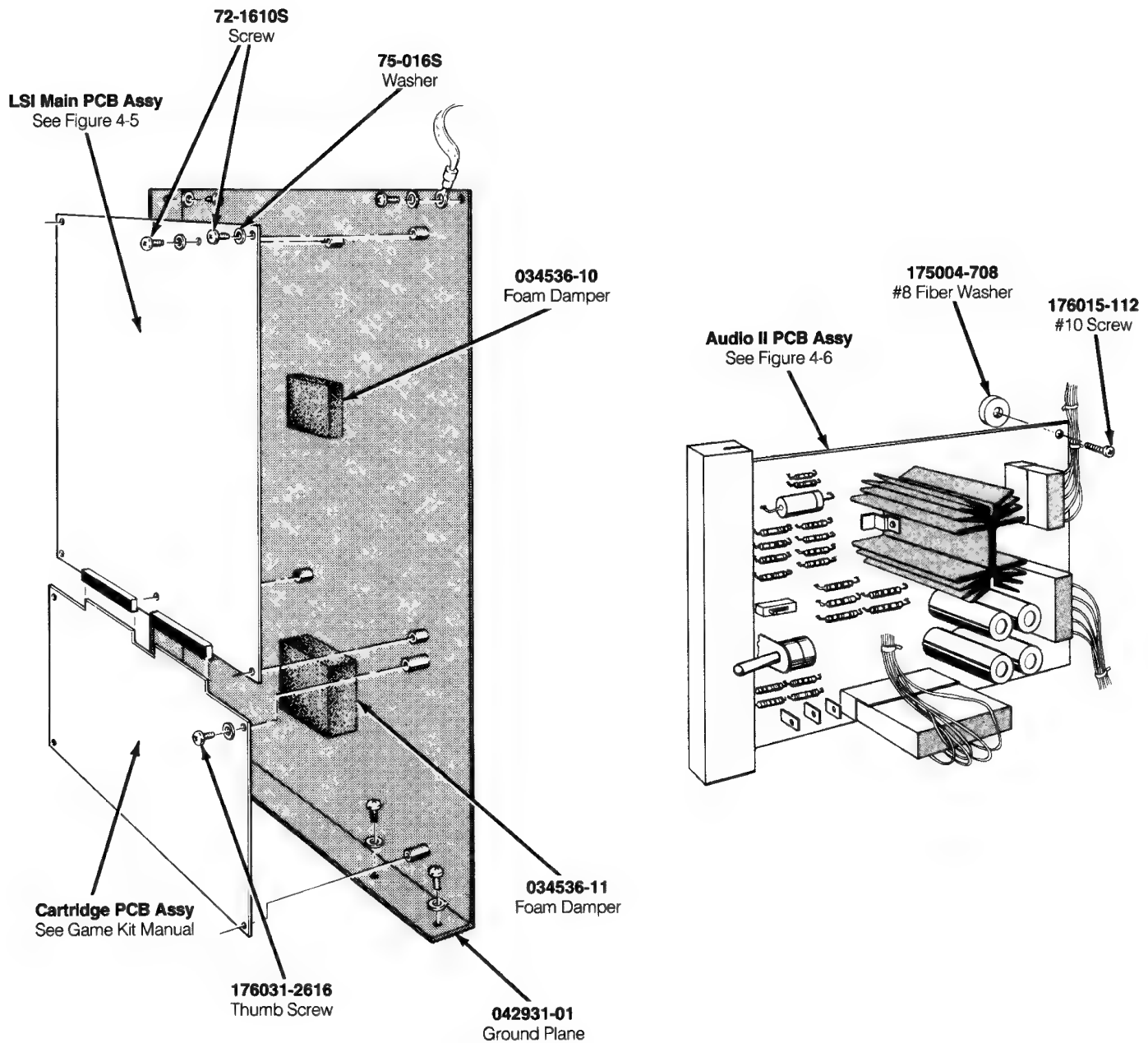


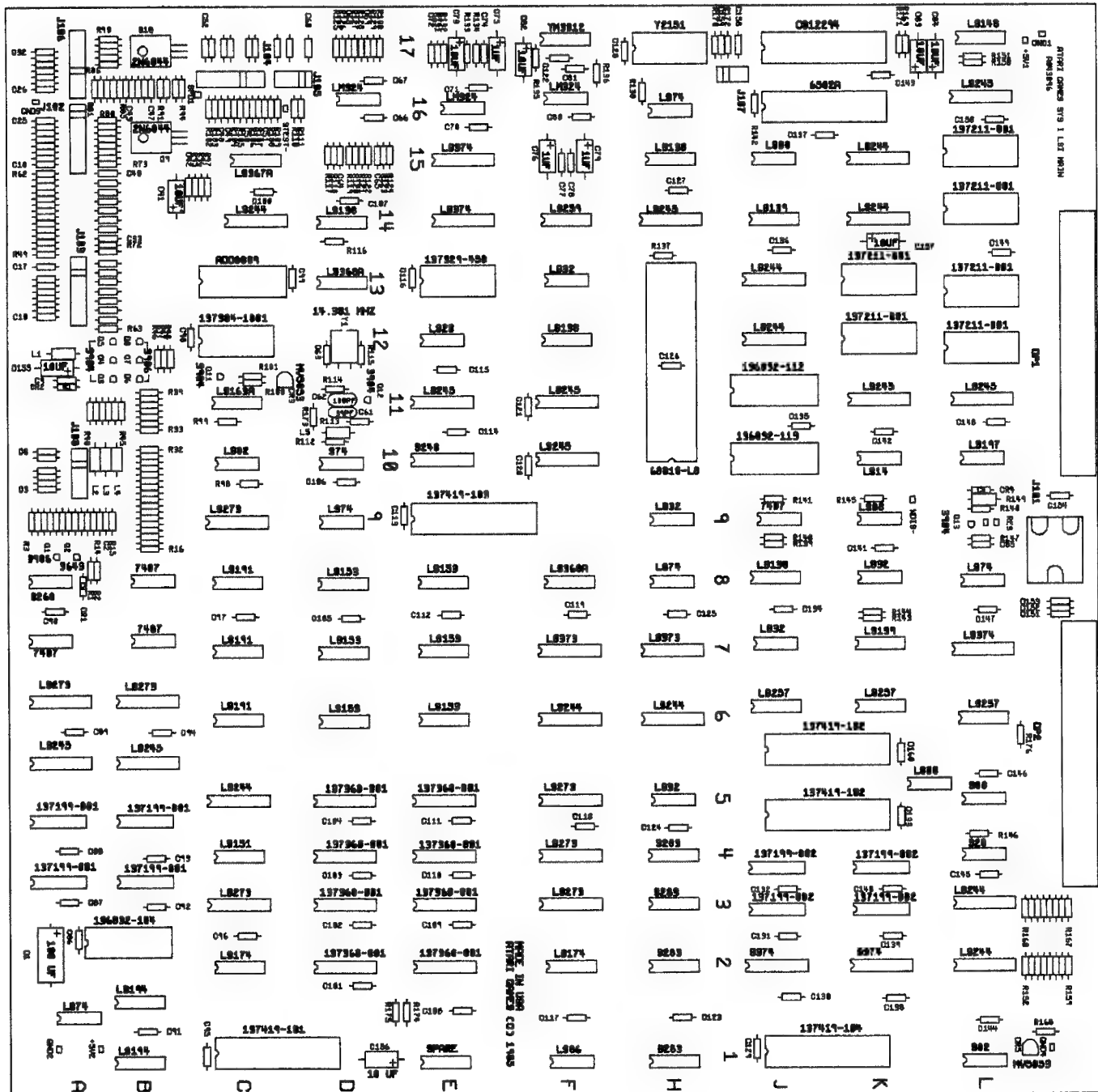
Figure 4-4 PCB Mounting Hardware
A042932-01 F

PCB Mounting Hardware Parts List

Part No.	Description
A043096-21	Atari System I LSI Main PCB Assembly—see Figure 4-5
A043661-02	Audio II PCB Assembly—see Figure 4-6
72-1610S	#6-32 × 5/8-Inch Cross-Recessed Pan-Head Machine Screw
75-016S	#6 Flat Washer
034536-10	3 × 6 × .62-Inch Foam Vibration Damper
034536-11	3 × 6 × .81-Inch Foam Vibration Damper
042931-01	PCB Ground Plane
175004-708	#8 Fiber Washer
176015-112	#10 × 3/4-Inch Cross-Recessed Pan-Head Deep-Threaded Screw
176031-2616	#6-32 × 1/2-Inch Brass Knurled Thumb Screw

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**Figure 4-5 LSI Main PCB Assembly
A043096-21 C**

LSI Main PCB Assembly Parts List

Designator	Description	Part No.
Integrated Circuits		
1/2A	Type-74LS74 Integrated Circuit	37-74LS74
1/2B	Type-74LS194 Integrated Circuit	37-74LS194
1B	Type-74LS194 Integrated Circuit	37-74LS194
1C	Custom Integrated Circuit	137419-101
1F	Type-74LS86 Integrated Circuit	37-74LS86
1H	Type-74S283 Integrated Circuit	137204-001
1J/K	Custom Integrated Circuit	137419-104
1L	Type-74S02 Integrated Circuit	37-74S02
2/3B	Type-2364A, 300 ns PROM Integrated Circuit (Acceptable substitute is part no. 136032-107)	136032-104
2C	Type-74LS174 Integrated Circuit	37-74LS174
2D	Type-1MS1420, 55 ns Static RAM Integrated Circuit	137360-001
2E	Type-1MS1420, 55 ns Static RAM Integrated Circuit	137360-001
2F	Type-74LS174 Integrated Circuit	37-74LS174
2H	Type-74S283 Integrated Circuit	137204-001
2J	Type-74S374 Integrated Circuit	137206-001
2K	Type-74S374 Integrated Circuit	137206-001
2L	Type-74LS244 Integrated Circuit	37-74LS244
3/4A	1024 × 4, 55 ns MOS Static RAM Integrated Circuit	137199-001
3/4B	1024 × 4, 55 ns MOS Static RAM Integrated Circuit	137199-001
3C	Type-74LS273 Integrated Circuit	37-74LS273
3D	Type-1MS1420, 55 ns Static RAM Integrated Circuit	137360-001
3E	Type-1MS1420, 55 ns Static RAM Integrated Circuit	137360-001
3F	Type-74LS273 Integrated Circuit	37-74LS273
3H	Type-74S283 Integrated Circuit	137204-001
3J	1024 × 4, 45 ns MOS Static RAM Integrated Circuit	137199-002
3K	1024 × 4, 45 ns MOS Static RAM Integrated Circuit	137199-002
3L	Type-74LS244 Integrated Circuit	37-74LS244
4C	Type-74LS151 Integrated Circuit	37-74LS151
4D	Type-1MS1420, 55 ns Static RAM Integrated Circuit	137360-001
4E	Type-1MS1420, 55 ns Static RAM Integrated Circuit	137360-001
4F	Type-74LS273 Integrated Circuit	37-74LS273
4H	Type-74S283 Integrated Circuit	137204-001
4J	1024 × 4, 45 ns MOS Static RAM Integrated Circuit	137199-002
4K	1024 × 4, 45 ns MOS Static RAM Integrated Circuit	137199-002
4L	Type-74S20 Integrated Circuit	137423-001
5/6A	Type-74LS245 Integrated Circuit	37-74LS245
5/6B	Type-74LS245 Integrated Circuit	37-74LS245
5A	1024 × 4, 55ns MOS Static RAM Integrated Circuit	137199-001
5B	1024 × 4, 55ns MOS Static RAM Integrated Circuit	137199-001
5C	Type-74LS244 Integrated Circuit	37-74LS244
5D	Type-1MS1420, 55 ns Static RAM Integrated Circuit	137360-001
5E	Type-1MS1420, 55 ns Static RAM Integrated Circuit	137360-001
5F	Type-74LS273 Integrated Circuit	37-74LS273
5H	Type-74LS32 Integrated Circuit	37-74LS32

LSI Main PCB Assembly Parts List, Continued

Designator	Description	Part No.
5J/K	Custom Integrated Circuit	137419-102
5K/L	Type-74LS00 Integrated Circuit	37-74LS00
5L	Type-74S08 Integrated Circuit	37-74S08
6A	Type-74LS273 Integrated Circuit	37-74LS273
6B	Type-74LS273 Integrated Circuit	37-74LS273
6C	Type-74LS191 Integrated Circuit	37-74LS191
6D	Type-74LS153 Integrated Circuit	37-74LS153
6E	Type-74LS153 Integrated Circuit	37-74LS153
6F	Type-74LS244 Integrated Circuit	37-74LS244
6H	Type-74LS244 Integrated Circuit	37-74LS244
6J	Type-74LS257 Integrated Circuit	37-74LS257
6K	Type-74LS257 Integrated Circuit	37-74LS257
6J/K	Custom Integrated Circuit	137419-102
6L	Type-74LS257 Integrated Circuit	37-74LS257
7A	Type-7407 Integrated Circuit	37-7407
7B	Type-7407 Integrated Circuit	37-7407
7C	Type-74LS191 Integrated Circuit	37-74LS191
7D	Type-74LS153 Integrated Circuit	37-74LS153
7E	Type-74LS153 Integrated Circuit	37-74LS153
7F	Type-74LS373 Integrated Circuit	37-74LS373
7H	Type-74LS373 Integrated Circuit	37-74LS373
7J	Type-74LS32 Integrated Circuit	37-74LS32
7K	Type-74LS139 Integrated Circuit	37-74LS139
7L	Type-74LS374 Integrated Circuit	37-74LS374
8A	Type-74S260 Integrated Circuit	37-74S260
8B	Type-7407 Integrated Circuit	37-7407
8C	Type-74LS191 Integrated Circuit	37-74LS191
8D	Type-74LS153 Integrated Circuit	37-74LS153
8E	Type-74LS153 Integrated Circuit	37-74LS153
8F	Type-74LS368A Integrated Circuit	137168-001
8H	Type-74LS74 Integrated Circuit	37-74LS74
8J	Type-74LS138 Integrated Circuit	137177-001
8K	Type-74LS32 Integrated Circuit	37-74LS32
8L	Type-74LS74 Integrated Circuit	37-74LS74
9C	Type-74LS273 Integrated Circuit	37-74LS273
9D	Type-74LS74 Integrated Circuit	37-74LS74
9E	Custom Integrated Circuit	137419-103
9H	Type-74LS32 Integrated Circuit	37-74LS32
9J	Type-7407 Integrated Circuit	37-7407
9K	Type-74LS08 Integrated Circuit	37-74LS08
10C	Type-74LS02 Integrated Circuit	37-74LS02
10D	Type-74S74 Integrated Circuit	37-74S74
10E	Type-74S240 Integrated Circuit	137416-001
10F	Type-74LS245 Integrated Circuit	37-74LS245

LSI Main PCB Assembly Parts List, Continued

Designator	Description	Part No.
10J	Type-23128A, 200 ns PROM Integrated Circuit (Acceptable substitute is part no. 136032-115)	136032-113
10K	Type-74LS14 Integrated Circuit	37-74LS14
10L	Type-74LS197 Integrated Circuit	137240-001
11C	Type-74LS163A Integrated Circuit	37-74LS163A
11E	Type-74LS245 Integrated Circuit	37-74LS245
11F	Type-74LS245 Integrated Circuit	37-74LS245
11J	Type-23128A, 200 ns PROM Integrated Circuit (Acceptable substitute is part no. 136032-114)	136032-112
11K	Type-74LS245 Integrated Circuit	37-74LS245
11L	Type-74LS245 Integrated Circuit	37-74LS245
12C	LETA Integrated Circuit	137304-1001
12E	Type-74LS20 Integrated Circuit	37-74LS20
12F	Type-74LS138 Integrated Circuit	137177-001
12H	Type-68010-L8 Microprocessor	137414-001
12J	Type-74LS244 Integrated Circuit	37-74LS244
12K	2048 × 8, 150 ns Static RAM Integrated Circuit	137211-001
12L	2048 × 8, 150 ns Static RAM Integrated Circuit	137211-001
13C	Type-ADC0809 Integrated Circuit	137243-001
13D	Type-74LS368A Integrated Circuit	137168-001
13E	Type-2804, 450 ns EPROM Integrated Circuit	137329-450
13F	Type-74LS32 Integrated Circuit	37-74LS32
13J	Type-74LS244 Integrated Circuit	37-74LS244
13K	2048 × 8, 150 ns Static RAM Integrated Circuit	137211-001
13L	2048 × 8, 150 ns Static RAM Integrated Circuit	137211-001
14C	Type-74LS244 Integrated Circuit	37-74LS244
14D	Type-74LS138 Integrated Circuit	137177-001
14E	Type-74LS374 Integrated Circuit	37-74LS374
14F	Type-74LS259 Integrated Circuit	37-74LS259
14H	Type-74LS245 Integrated Circuit	37-74LS245
14J	Type-74LS139 Integrated Circuit	37-74LS139
14K	Type-74LS244 Integrated Circuit	37-74LS244
14L	2048 × 8, 150 ns Static RAM Integrated Circuit	137211-001
15C	Type-74LS367A Integrated Circuit	37-74LS367
15E	Type-74LS374 Integrated Circuit	37-74LS374
15H	Type-74LS138 Integrated Circuit	137177-001
15J	Type-74LS00 Integrated Circuit	37-74LS00
15K	Type-74LS244 Integrated Circuit	37-74LS244
15L	2048 × 8, 150 ns Static RAM Integrated Circuit	137211-001
16D	Type-LM324 Integrated Circuit	37-LM324
16E	Type-LM324 Integrated Circuit	37-LM324
16F	Type-LM324 Integrated Circuit	37-LM324
16J/K	Type-6502A Microprocessor	90-6013
16H	Type-74LS74 Integrated Circuit	37-74LS74
16L	Type-74LS245 Integrated Circuit	37-74LS245
17F	Type-YM3012 Integrated Circuit	137402-001

LSI Main PCB Assembly Parts List, Continued

Designator	Description	Part No.
17H	Type-YM2151 Integrated Circuit	137401-001
17J/K	Custom Integrated Circuit	CO12294
17L	Type-74LS148 Integrated Circuit	137417-001
Capacitors		
C1	100 μ F, 25 V Electrolytic Capacitor	24-250107
C2	.1 μ F, 50 V Ceramic Capacitor	122002-104
C3-C5	470 pF, 50 V Ceramic Capacitor	122013-471
C6-C8	1000 pF, 100 V Ceramic Capacitor	122016-102
C9	.1 μ F, 50 V Ceramic Capacitor	122002-104
C10-C17	.01 μ F, 25 V Ceramic Capacitor	122005-103
C18-C40	.1 μ F, 50 V Ceramic Capacitor	122002-104
C41	10 μ F, 25 V Electrolytic Capacitor	24-250106
C42-C58	.1 μ F, 50 V Ceramic Capacitor	122002-104
C59	.01 μ F, 25 V Ceramic Capacitor	122005-103
C60	.01 μ F, 25 V Ceramic Capacitor	122005-103
C61	39 pF, 100 V Mica Capacitor	128002-390
C62	100 pF, 100 V Mica Capacitor	128002-101
C63	.1 μ F, 50 V Ceramic Capacitor	122002-104
C64	1000 pF, 100 V Ceramic Capacitor	122016-102
C65	1000 pF, 100 V Ceramic Capacitor	122016-102
C66	.1 μ F, 50 V Ceramic Capacitor	122002-104
C67	.1 μ F, 50 V Ceramic Capacitor	122002-104
C68	1000 pF, 100 V Ceramic Capacitor	122016-102
C69	1000 pF, 100 V Ceramic Capacitor	122016-102
C70	.1 μ F, 50 V Ceramic Capacitor	122002-104
C71	.1 μ F, 50 V Ceramic Capacitor	122002-104
C72	.001 μ F, 50 V Ceramic Capacitor	122002-102
C73	10 μ F, 25 V Electrolytic Capacitor	24-250106
C74	1000 pF, 100 V Ceramic Capacitor	122016-102
C75	1 μ F, 50 V Electrolytic Capacitor	24-500105
C76	1 μ F, 50 V Electrolytic Capacitor	24-500105
C77	.0027, 50 V Ceramic Capacitor	122015-272
C78	.0027, 50 V Ceramic Capacitor	122015-272
C79	1 μ F, 50 V Electrolytic Capacitor	24-500105
C80	.1 μ F, 50 V Ceramic Capacitor	122002-104
C81	.1 μ F, 50 V Ceramic Capacitor	122002-104
C82-C84	10 μ F, 25 V Electrolytic Capacitor	24-250106
C85-C154	.1 μ F, 50 V Ceramic Capacitor	122002-104
C155	10 μ F, 25 V Electrolytic Capacitor	24-250106
C156	10 μ F, 25 V Electrolytic Capacitor	24-250106
C158-C160	.1 μ F, 50 V Ceramic Capacitor	122002-104
Diodes		
CR1, CR2	Type-IN4148 Diode	131033-001
CR3	Type-MV5053 Diode	38-MV5053
CR4	Type-IN754A Diode	131002-001
CR5	Type-MV5053 Diode	38-MV5053

LSI Main PCB Assembly Parts List, Continued

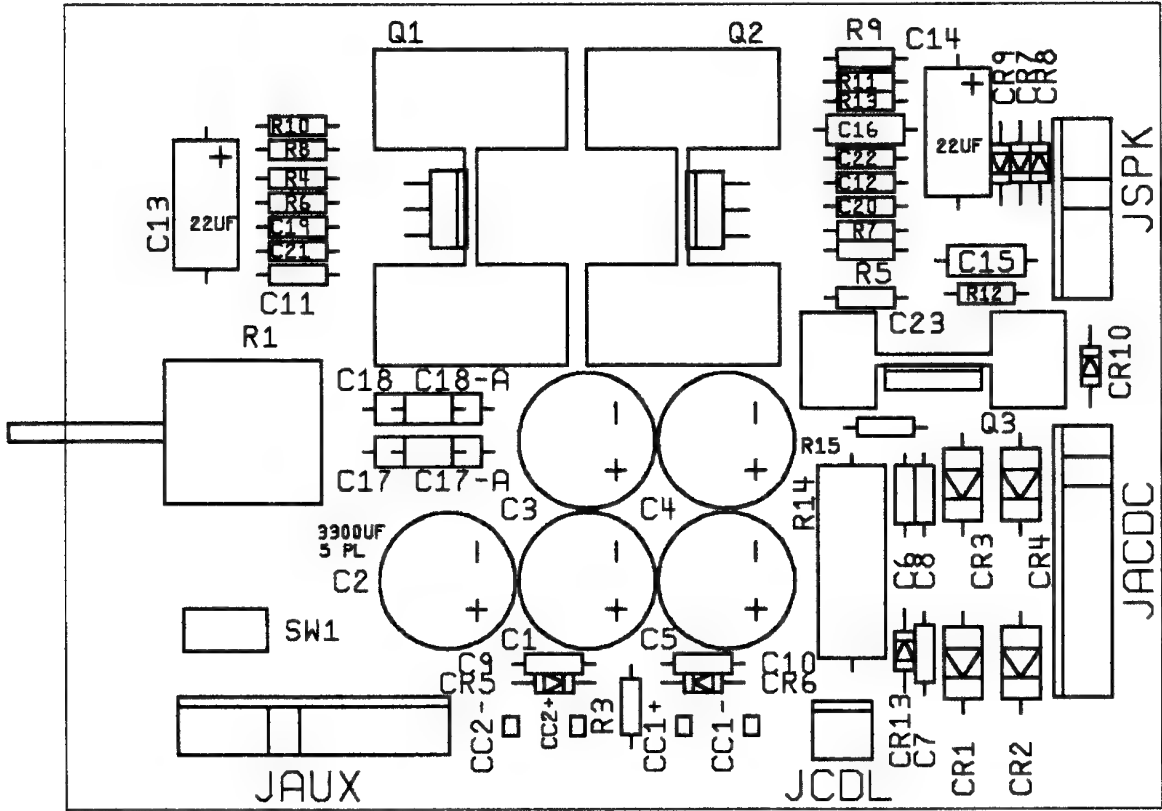
Designator	Description	Part No.
Connectors		
CP1, CP2	80-Position Card Edge Connector	179221-180
J101	12-Position Header Connector	179069-012
J102-J104	11-Position Square Pin Header Connector	179118-011
J105	6-Position Square Pin Header Connector	179118-006
J106	11-Position Square Pin Header Connector	179118-011
J107	5-Position Square Pin Header Connector	179118-005
J108	8-Position Square Pin Header Connector	179118-008
Inductors		
L1	68 μ H Inductor	141016-008
L2-L4	1 μ H Inductor	141007-001
L5	100 μ H Inductor	41-3003
Transistors		
Q1	Type-2N3906 Transistor	33-2N3906
Q2	Type-2N3643 Transistor	34-2N3643
Q3-Q5	Type-2N3904 Transistor	34-2N3904
Q6-Q8	Type-2N3906 Transistor	33-2N3906
Q9, Q10	Type-2N6044 Transistor	34-2N6044
Q11-Q13	Type-2N3904 Transistor	34-2N3904
Resistors		
R1	510 Ω , $\pm 5\%$, $\frac{1}{4}$ W Resistor	110000-511
R2	68 Ω , $\pm 5\%$, $\frac{1}{4}$ W Resistor	110000-680
R3-R6	27 Ω , $\pm 5\%$, $\frac{1}{4}$ W Resistor	110000-270
R7	20 k Ω , $\pm 5\%$, $\frac{1}{4}$ W Resistor	110000-203
R8	10 k Ω , $\pm 5\%$, $\frac{1}{4}$ W Resistor	110000-103
R9	4.99 k Ω , $\pm 1\%$, $\frac{1}{4}$ W Resistor	110011-502
R10	2.49 k Ω , $\pm 1\%$, $\frac{1}{4}$ W Resistor	110011-252
R11-R14	100 Ω , $\pm 5\%$, $\frac{1}{4}$ W Resistor	110000-101
R15	2.2 k Ω , $\pm 5\%$, $\frac{1}{4}$ W Resistor	110000-222
R16-R19	330 Ω , $\pm 5\%$, $\frac{1}{4}$ W Resistor	110000-331
R20	2.2 k Ω , $\pm 5\%$, $\frac{1}{4}$ W Resistor	110000-222
R21	4.7 k Ω , $\pm 5\%$, $\frac{1}{4}$ W Resistor	110000-472
R22	10 k Ω , $\pm 5\%$, $\frac{1}{4}$ W Resistor	110000-103
R23	20 k Ω , $\pm 5\%$, $\frac{1}{4}$ W Resistor	110000-203
R24-R27	330 Ω , $\pm 5\%$, $\frac{1}{4}$ W Resistor	110000-331
R28	2.2 k Ω , $\pm 5\%$, $\frac{1}{4}$ W Resistor	110000-222
R29	4.7 k Ω , $\pm 5\%$, $\frac{1}{4}$ W Resistor	110000-472
R30	10 k Ω , $\pm 5\%$, $\frac{1}{4}$ W Resistor	110000-103
R31	20 k Ω , $\pm 5\%$, $\frac{1}{4}$ W Resistor	110000-203
R32-R35	330 Ω , $\pm 5\%$, $\frac{1}{4}$ W Resistor	110000-331
R36	2.2 k Ω , $\pm 5\%$, $\frac{1}{4}$ W Resistor	110000-222
R37	4.7 k Ω , $\pm 5\%$, $\frac{1}{4}$ W Resistor	110000-472
R38	10 k Ω , $\pm 5\%$, $\frac{1}{4}$ W Resistor	110000-103
R39	20 k Ω , $\pm 5\%$, $\frac{1}{4}$ W Resistor	110000-203
R40-R45	68 Ω , $\pm 5\%$, $\frac{1}{4}$ W Resistor	110000-680
R46-R48	510 Ω , $\pm 5\%$, $\frac{1}{4}$ W Resistor	110000-511
R49-R62	10 k Ω , $\pm 5\%$, $\frac{1}{4}$ W Resistor	110000-103
R63-R70	3.3 k Ω , $\pm 5\%$, $\frac{1}{4}$ W Resistor	110000-332

LSI Main PCB Assembly Parts List, Continued

Designator	Description	Part No.
R71, R72	10 k Ω , $\pm 5\%$, $\frac{1}{4}$ W Resistor	110000-103
R73-R80	100 Ω , $\pm 5\%$, $\frac{1}{4}$ W Resistor	110000-101
R81-R85	1 k Ω , $\pm 5\%$, $\frac{1}{4}$ W Resistor	110000-102
R86-R90	470 Ω , $\pm 5\%$, $\frac{1}{4}$ W Resistor	110000-471
R91-R94	1 k Ω , $\pm 5\%$, $\frac{1}{4}$ W Resistor	110000-102
R95	150 Ω , $\pm 5\%$, $\frac{1}{4}$ W Resistor	110000-151
R96	220 Ω , $\pm 5\%$, $\frac{1}{4}$ W Resistor	110000-221
R97	150 Ω , $\pm 5\%$, $\frac{1}{4}$ W Resistor	110000-151
R98	4.7 k Ω , $\pm 5\%$, $\frac{1}{4}$ W Resistor	110000-472
R99	1 k Ω , $\pm 5\%$, $\frac{1}{4}$ W Resistor	110000-102
R100	220 Ω , $\pm 5\%$, $\frac{1}{4}$ W Resistor	110000-221
R101	4.7 k Ω , $\pm 5\%$, $\frac{1}{4}$ W Resistor	110000-472
R102	1 k Ω , $\pm 5\%$, $\frac{1}{4}$ W Resistor	110000-102
R103	470 Ω , $\pm 5\%$, $\frac{1}{4}$ W Resistor	110000-471
R104	1 k Ω , $\pm 5\%$, $\frac{1}{4}$ W Resistor	110000-102
R105	470 Ω , $\pm 5\%$, $\frac{1}{4}$ W Resistor	110000-471
R106	1 k Ω , $\pm 5\%$, $\frac{1}{4}$ W Resistor	110000-102
R107	470 Ω , $\pm 5\%$, $\frac{1}{4}$ W Resistor	110000-471
R108	1 k Ω , $\pm 5\%$, $\frac{1}{4}$ W Resistor	110000-102
R109	470 Ω , $\pm 5\%$, $\frac{1}{4}$ W Resistor	110000-471
R110, R111	220 Ω , $\pm 5\%$, $\frac{1}{4}$ W Resistor	110000-221
R112	1 k Ω , $\pm 5\%$, $\frac{1}{4}$ W Resistor	110000-102
R113	390 Ω , $\pm 5\%$, $\frac{1}{4}$ W Resistor	110000-391
R114, R115	10 k Ω , $\pm 5\%$, $\frac{1}{4}$ W Resistor	110000-103
R116	4.7 k Ω , $\pm 5\%$, $\frac{1}{4}$ W Resistor	110000-472
R117	15 k Ω , $\pm 5\%$, $\frac{1}{4}$ W Resistor	110000-153
R118	22 k Ω , $\pm 5\%$, $\frac{1}{4}$ W Resistor	110000-223
R119	1 k Ω , $\pm 5\%$, $\frac{1}{4}$ W Resistor	110000-102
R120, R121	10 k Ω , $\pm 5\%$, $\frac{1}{4}$ W Resistor	110000-103
R122	1 k Ω , $\pm 5\%$, $\frac{1}{4}$ W Resistor	110000-102
R123	22 k Ω , $\pm 5\%$, $\frac{1}{4}$ W Resistor	110000-223
R124	15 k Ω , $\pm 5\%$, $\frac{1}{4}$ W Resistor	110000-153
R125	10 k Ω , $\pm 5\%$, $\frac{1}{4}$ W Resistor	110000-103
R126	39 k Ω , $\pm 5\%$, $\frac{1}{4}$ W Resistor	110000-393
R127, R128	27 k Ω , $\pm 5\%$, $\frac{1}{4}$ W Resistor	110000-273
R129	39 k Ω , $\pm 5\%$, $\frac{1}{4}$ W Resistor	110000-393
R130	10 k Ω , $\pm 5\%$, $\frac{1}{4}$ W Resistor	110000-103
R131	15 k Ω , $\pm 5\%$, $\frac{1}{4}$ W Resistor	110000-153
R132, R133	10 k Ω , $\pm 5\%$, $\frac{1}{4}$ W Resistor	110000-103
R134	1 k Ω , $\pm 5\%$, $\frac{1}{4}$ W Resistor	110000-102
R135	390 Ω , $\pm 5\%$, $\frac{1}{4}$ W Resistor	110000-391
R136	560 Ω , $\pm 5\%$, $\frac{1}{4}$ W Resistor	110000-561
R137, R138	1 k Ω , $\pm 5\%$, $\frac{1}{4}$ W Resistor	110000-102
R139, R140	10 k Ω , $\pm 5\%$, $\frac{1}{4}$ W Resistor	110000-103

LSI Main PCB Assembly Parts List, Continued

Designator	Description	Part No.
R141	4.7 k Ω , \pm 5%, ¼ W Resistor	110000-472
R142	1 k Ω , \pm 5%, ¼ W Resistor	110000-102
R143, R144	4.7 k Ω , \pm 5%, ¼ W Resistor	110000-472
R145	10 k Ω , \pm 5%, ¼ W Resistor	110000-103
R146	1 k Ω , \pm 5%, ¼ W Resistor	110000-102
R147	4.7 k Ω , \pm 5%, ¼ W Resistor	110000-472
R148	1 k Ω , \pm 5%, ¼ W Resistor	110000-102
R149	220 Ω , Resistor, ½ W Ω , \pm 5%,	110001-221
R150, R151	4.7 k Ω , \pm 5%, ¼ W Resistor	110000-472
R152-R167	1 k Ω , \pm 5%, ¼ W Resistor	110000-102
R168	220 Ω , \pm 5%, ¼ W Resistor	110000-221
R169, R170	4.7 k Ω , \pm 5%, ¼ W Resistor	110000-472
R171, R172	47 Ω , \pm 5%, ¼ W Resistor	110000-470
R173	220 Ω , \pm 5%, ¼ W Resistor	110000-221
R174, R175	330 Ω , \pm 5%, ¼ W Resistor	110000-331
R176	1 k Ω , \pm 5%, ¼ W Resistor	110000-102
Sockets		
1C	40-Pin, Medium-Insertion-Force, Integrated Circuit Socket	79-42C40
1J/K	40-Pin, Medium-Insertion-Force, Integrated Circuit Socket	79-42C40
2/3B	28-Pin, Medium-Insertion-Force, Integrated Circuit Socket	79-42C28
5/6J/K	40-Pin, Medium-Insertion-Force, Integrated Circuit Socket	79-42C40
5J/K	40-Pin, Medium-Insertion-Force, Integrated Circuit Socket	79-42C40
9E	40-Pin, Medium-Insertion-Force, Integrated Circuit Socket	79-42C40
10J	28-Pin, Medium-Insertion-Force, Integrated Circuit Socket	79-42C28
11J	28-Pin, Medium-Insertion-Force, Integrated Circuit Socket	79-42C28
12H	64-Pin, Medium-Insertion-Force, Integrated Circuit Socket	79-42C64
13E	24-Pin, Medium-Insertion-Force, Integrated Circuit Socket	79-42C24
16J/K	40-Pin, Medium-Insertion-Force, Integrated Circuit Socket	79-42C40
17F	16-Pin, Medium-Insertion-Force, Integrated Circuit Socket	79-42C16
17H	24-Pin, Medium-Insertion-Force, Integrated Circuit Socket	79-42C24
17J/K	40-Pin, Medium-Insertion-Force, Integrated Circuit Socket	79-42C40
Miscellaneous		
Q9, Q10	Nylon Snap-In Fastener	81-4302
Y1	14.381 MHZ Crystal	90-101
	Test Point (Acceptable substitute is part no. 020670-01)	179051-002



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TABLE A
OPTIONS (USED/NOT USED)

DESIG	VERS	-01	-02	-03
R1		Y	Y	
C17		Y	Y	
C18		Y	Y	
C17-A		N	N	
C18-A		N	N	
SW1		Y	Y	
Q3		Y *	Y *	
Q3 HEATSINK		Y	N	
R14		N	N	
R15		N	N	

* SEE P/L FOR VALUE

Figure 4-6 Audio II PCB Assembly
A043661-02 B

Audio II PCB Assembly Parts List

Designator	Description	Part No.
Capacitors		
C1-C5	3300 μ F, 25 V Radial Electrolytic Capacitor	123003-338
C6-C12	.1 μ F, 50 V Ceramic Capacitor	122002-104
C13-C14	22 μ F, 35 V Electrolytic Capacitor	24-350226
C15-C18	.22 μ F, 25 V Ceramic Capacitor	122006-224
C19-C20	.001 μ F, 50 V Ceramic Capacitor	122002-102
C21-C23	.1 μ F, 50 V Ceramic Capacitor	122002-104
Diodes		
CR1-CR4	Type-1N5401 Diode	31-1N5401
CR5-CR10	Type-1N4001 Diode	31-1N4001
CR13	Type-1N4002 Diode	31-1N4002
Connectors		
JACDC	Key 6, 9 Ckt., .156-Inch Ctr. Header Connector	179213-009
JAUX	Key 6, 9 Ckt., .156-Inch Ctr. Header Connector	179213-009
JCDL	2 Ckt., .156-Inch Ctr. Header Connector	179213-002
JSPK	Key 3, 6 Ckt., .156-Inch Ctr. Header Connector	179213-006
Integrated Circuits		
Q1-Q2	Type-TDA-2030 Amplifier	137301-001
Q3	Standup Type-7815 Integrated Circuit	37-7815
Resistors		
R1	10 k Ω , Dual Horizontal Pot Resistor	119011-103
R3	10 Ω , $\pm 5\%$, $\frac{1}{4}$ W Resistor	110000-100
R4-R7	22 k Ω , $\pm 5\%$, $\frac{1}{4}$ W Resistor	110000-223
R8-R9	10 k Ω , $\pm 5\%$, $\frac{1}{4}$ W Resistor	110000-103
R10-R11	1 k Ω , $\pm 5\%$, $\frac{1}{4}$ W Resistor	110000-102
R12-R13	1 Ω , $\pm 5\%$, $\frac{1}{4}$ W Resistor	110000-010
R14	0 Ω , $\pm 5\%$, $\frac{1}{4}$ W Resistor	110005-001
Miscellaneous		
SW1	SPDT Miniature Slide Self-Test Switch	69-004
	Type-TDA-2030 Heat Sink	178190-032
	#6-32 \times 3/8-Inch Cross-Recessed Pan-Head Screw	72-1606S
	#6-32 Nut/Washer Assembly	75-99516
	Thermal Compound	78-16001
	Hot Melt Adhesive	106006-001
	Test Point	179051-001

Glossary

AC

Alternating current; from zero it rises to a maximum positive level, then passes through zero again to a maximum negative level.

ACTIVE STATE

The true state of a signal. For example: The active state for START is low.

ADDRESS

A value that identifies a specific location of data in memory; normally expressed in hexadecimal notation.

ANALOG

Measurable in an absolute quantity (as opposed to on or off). Analog devices are volume controls, light dimmers, stereo amplifiers, etc.

ANODE

The positive (arrow) end of a diode.

AMPLIFIER

A device used to increase the strength of an applied signal.

AMPLITUDE

The maximum instantaneous value of a waveform pulse from zero.

ASTABLE

Having no normal state. An astable device will free-run or oscillate as long as operating voltage is applied. The oscillation frequency is usually controlled by external circuitry.

AUXILIARY COIN SWITCH

A momentary-contact pushbutton switch with a black cap located on the utility panel. The auxiliary coin switch adds credits to the game without activating a coin counter.

BEZEL

A cut, formed, or machined retention device, such as the conical device used to mount a pushbutton switch to a control panel, or the formed device used to frame the video display screen.

BIDIRECTIONAL

Able to send or receive data on the same line (e.g., the data bus of a microprocessor).

BINARY

A number system that expresses all values by using two digits (0 and 1).

BIT

A binary digit; expressed as 1 or 0.

BLANKING

Turning off the beam on a cathode-ray tube during retrace.

BLOCK DIAGRAM

A drawing in which functional circuitry units are represented by blocks. Very useful during initial troubleshooting.

BUFFER

1. An isolating circuit designed to eliminate the reaction of a driven circuit on the circuits driving it (e.g., a buffer amplifier).

2. A device used to supply additional drive capability.

BUS

An electrical path over which information is transferred from any of several sources to any of several destinations.

CAPACITOR

A device capable of storing electrical energy. A capacitor blocks the flow of DC current while allowing AC current to pass.

CATHODE

The negative end of a diode.

CHIP

An integrated circuit comprising many circuits on a single wafer slice.

CLOCK

A repetitive timing signal for synchronizing system functions.

COINCIDENCE

Occurring at the same time.

COIN COUNTER

A 6-digit electromechanical device that counts the coins inserted in the coin mechanism(s).

COIN MECHANISM

A device on the inside of the coin door that inspects the coin to determine if the correct coin has been inserted.

COMPLEMENTARY

Having opposite states, such as the outputs of a flip-flop.

COMPOSITE SYNC

Horizontal and vertical synchronization pulses that are bused together into a single signal. This signal provides the timing necessary to keep the display in synchronization with the game circuitry.

COMPOSITE VIDEO

Complete video signal from the game system to drive the display circuitry, usually comprising H SYNC, V SYNC, and the video.

CREDIT

One play for one person based on the game switch settings.

CRT

Cathode-ray tube.

DATA

General term for the numbers, letters, and symbols that serve as input for device processing.

DARLINGTON

A two-transistor amplifier that provides extremely high gain.

DC

Direct current, meaning current flowing in one direction and of a fixed value.

DEFLECTION YOKE

Electromagnetic coils around the neck of a cathode-ray tube. One set of coils deflects the electron beam horizontally and the other set deflects the beam vertically.

DIAGNOSTICS

A programmed routine for checking circuitry. For example: the self-test is a diagnostic routine.

DIODE

A semiconductor device that conducts in only one direction.

DISCRETE

Non-integrated components, such as resistors, capacitors, and transistors.

DMA

Direct memory access. DMA is a process of accessing memory that bypasses the microprocessor logic. DMA is normally used for transferring data between the input/output ports and memory.

DOWN TIME

The period during which a game is malfunctioning or not operating correctly due to machine failure.

EAROM

Electrically alterable read-only memory (see ROM). The EAROM is a memory that can be changed by the application of high voltage.

FLYBACK

A step-up transformer used in a display to provide the high voltage.

GATE

1. A circuit with one output that responds only when a certain combination of pulses is present at the inputs.
2. A circuit in which one signal switches another signal on and off.
3. To control the passage of a pulse or signal.

HARNESS

A prefabricated assembly of insulated wires and terminals ready to be attached to a piece of equipment.

HEXADECIMAL

A number system using the equivalent of the decimal number 16 as a base. The symbols 0-9 and A-F are usually used.

IMPLODE

To burst inward; the inward collapse of a vacuum tube.

I/O

Input/Output.

IRQ

Interrupt request. IRQ is a control signal to the microprocessor that is generated by external logic. This signal tells the microprocessor that external logic needs attention. Depending on the program, the processor may or may not respond.

LED

The abbreviation for a light-emitting diode.

LOCKOUT COIL

Directs coins into the coin return box when there is no power to the game.

LOGIC STATE

The binary (1 or 0) value at the node of a logic element or integrated circuit during a particular time. Also called the logic level. The list below shows the voltage levels corresponding to the logic states (levels) in a TTL system.

Logic 0, Low = 0 VDC to +0.8 VDC

Grey Area (Tri-State Level) =

+0.8 VDC to +2.4 VDC

Logic 1, High = +2.4 VDC to +5 VDC

MULTIPLEXER

A device that takes several low-speed inputs and combines them into one high-speed data stream for simultaneous transmission on a single line.

NMI

Non-maskable interrupt. NMI is a request for service by the microprocessor from external logic. The microprocessor cannot ignore this interrupt request.

PAGE

A subsection of memory. A read-only memory device (see ROM) is broken into discrete blocks of data. These blocks are called pages. Each block has X number of bytes.

PCB

The abbreviation for a printed-circuit board.

PHOTOTRANSISTOR

A transistor that is activated by an external light source.

POTENTIOMETER

1. A resistor that has a continuously moving contact which is generally mounted on a moving shaft. Used chiefly as a voltage divider. Also called a *pot* (slang).

2. An instrument for measuring a voltage by balancing it against a known voltage.

RAM

Random-access memory. A device for the temporary storage of data.

RASTER-SCAN DISPLAY

A display system whereby images are displayed by continuously scanning the cathode-ray tube horizontally and vertically with an electron beam. The display system controls the intensity of the electron beam.

RETRACE

In a raster-scan display, retrace is the time during which the cathode-ray tube electron beam is resetting either from right to left or from bottom to top.

RESISTOR

A device designed to have a definite amount of resistance. Used in circuits to limit current flow or to provide a voltage drop.

ROM

Read-only memory. A device for the permanent storage of data.

SIGNATURE ANALYSIS

A process of isolating digital logic faults at the component level by means of special test equipment called signature analyzers. Basically, signature analyzers (e.g., the ATARI® CAT Box) convert lengthy bit streams into four-digit hexadecimal signatures. The signature read by the analyzer at each circuit node is then compared with the known good signature for that node. This process continues until a fault is located.

TROUBLESHOOT

The process of locating and repairing a fault.

VECTOR

A line segment drawn between specific X and Y coordinates on a cathode-ray tube.

WATCHDOG

A counter circuit designed to protect the microprocessor from self-destruction if a program malfunction occurs. If a malfunction does occur, the counter applies continuous pulses to the reset line of the microprocessor, which causes the microprocessor to keep resetting.

X-Y DISPLAY

A display system whereby images are displayed with vectors.

ZENER DIODE

A special diode used as a regulator. Its main characteristic is breaking down at a specified reverse-bias (Zener) voltage.

Warranty

Seller warrants that its printed-circuit boards and parts thereon are free from defects in material and workmanship under normal use and service for a period of ninety (90) days from date of shipment. Seller warrants that its video displays and laser-video disc players (in games supplied with displays and video-disc players) are free from defects in material and workmanship under normal use and service for a period of thirty (30) days from date of shipment. None of the Seller's other products or parts thereof are warranted.

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- (a) Seller is promptly notified in writing upon discovery by Buyer that said products are defective;
- (b) Such products are returned prepaid to Seller's plant; and
- (c) Seller's examination of said products discloses to Seller's satisfaction that such alleged defects existed and were not caused by accident, misuse, neglect, alteration, improper repair, installation, or improper testing.

In no event shall Seller be liable for loss of profits, loss of use, incidental or consequential damages.

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